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MINNESOTA MEDICINE

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Vol. VI APRIL, 1923 No. 4

ORIGINAL ARTICLES

PRACTICAL APPLICATION OF LOCAL ANESTHESIA TO MAJOR SURGERY*

ROBERT EMMETT FARR, M.D.
Minneapolis

Volumes have been written upon the advantages of local over general anesthesia and it is yet an undecided question as to the relative merits of each. We may accept as a fact, I think, the statement that the use of local anesthesia is markedly on the increase and that its qualifications are being tested out in many clinics in which it was practically never used before, and that those who had previously used the method have, in numerous instances, greatly broadened its application in their work. The more extensive trial of local anesthesia cannot fail to bring about certain results.

As the application of the method broadens there will naturally develop a better knowledge of the manner in which it should be applied. This will have the effect of demonstrating such merit as it may possess and thus the relative position which the method is to occupy will more readily become apparent.

Assuming that the trend of the times, surgically speaking, is toward the more extended use of local anesthesia (it is the writer's belief from such observation as he has been able to make that most surgeons now use it as a matter of preference in cases in which they can carry out surgical procedures efficiently under its influence), it would seem that one of the most important factors for consideration is the actual technic of its administration and, more particularly, the technic of performing surgical operations when using this method.

With regard to the method of administering local anesthesia, two procedures, broadly speaking, present themselves. They are *regional* or *conduction anesthesia* and *direct infiltration*. Each method has its advocates as well as its special points of excellence. Certain nerve trunks such as the trigeminus, the brachial, and the intercostals present a most excellent opportunity for the application of regional anesthesia. Again, other regions of the body which do not lend themselves so readily to the use of regional anesthesia may seem more favorable fields for the use of infiltration or "infiltration block." All regions which are devoid of definite landmarks which make it possible to reduce the margin of error to the minimum should, in the writer's opinion, be anesthetized by means of infiltration or infiltration block. Aside from such examples as those mentioned above, most regions of the body do not present the ideal characteristics in which regional anesthesia may be carried out with ease.

Infiltration block, which in its universal application places fewer restrictions upon the surgeon, is indicated only when direct infiltration is contraindicated. That is, when for some reason one wishes to avoid injecting the solution directly into the field which is to be incised. The presence of infection, malignant disease, or conditions in which the field of operation might be obscured by making direct infiltration into the tissues are the common conditions which contraindicate direct infiltration.

Eliminating the regions in which conduction anesthesia is indicated, such as the branches of the fifth nerve, the intercostal, the brachial and cervical plexuses and, to a lesser degree, the individual nerves of the extremities, in addition to the locations and conditions calling for infiltration block, there still remains, in the writer's opinion, an extensive field for the use of direct infiltration.

Its use is almost universally demanded in all instances in which the establishment of regional anesthesia has, for instance, been incomplete. At the present time the percentage of cases in which this condition obtains is so high that, with few exceptions, reinforcement of the anesthesia may

*Presented before the Minnesota State Medical Association, Minneapolis, October 13, 1922.

be called for at any time during an operation and for this reason alone the writer feels that it will be some time before it will be found practicable for one individual to administer local anesthesia to a patient and pass him on to the surgeon for the performance of an operation. At present this plan can be carried out with success in only a comparatively small percentage of cases. And while this method has at once considerable appeal, an analysis of the question involved will show many reasons why it will probably be slow of adoption.

As stated above there are at present but comparatively few regions in which it is actually possible for the local anesthetist to prepare a patient for the complete carrying out of a surgical procedure. Again, while it is true that local anesthesia is at present comparatively safe when properly used, it is yet advisable to employ it in as small quantities as are compatible with the demands of each case. It is apparent that one must use larger amounts when attempting to completely anesthetize a patient before an operation is begun, than when following the opposite plan which allows one to introduce but a minimum amount of the solution and reinforce the anesthesia at any time throughout the progress of the operation, provided this reinforcement should become necessary.

Likewise there are many types of operations in which it is of great advantage to expose certain deep-seated fields before attempting their anesthetization. In intraperitoneal work demanding the use of anterior splanchnic anesthesia this method is most urgently demanded. Furthermore, in a certain percentage of cases it may be impossible to complete an operation under the time limit demanded by the preliminary anesthetization of the tissues and reinforcement may become necessary during the later stages of the operation. Here, especially, the demand that the operator be his own anesthetist is most urgent.

One hears a great deal at this time concerning the question of psychic incompatibility. While it is the writer's belief that objection to the use of local anesthesia on this ground is greatly overestimated, and that with the advent of painless operations under local anesthesia it will gradually disappear, it would seem that for the present, at least, the confidence of the patient would be best secured by the surgeon himself administering the anesthetic because it is the surgeon above all others in whom the patient naturally has the greatest confidence.

The objections offered to the plan are mainly that the surgeon is generally absorbed entirely with the details of the operation and should not be handicapped by the additional burden which is placed upon him by the administration of the anesthetic, and that the time required to prepare himself for this work is too great. Again, that the administration of local anesthesia is time-consuming and irksome. With regard to the first objection, it may be said that there are few surgeons who are not most intimately engaged in keeping an eye on the administration of the anesthetic in every operation which they perform. It is a detail intimately connected with the daily routine of the surgeon and few conscientious surgeons find themselves able to avoid this responsibility. Secondly, the additional time required in learning to administer local anesthesia and the irksomeness connected therewith will depend largely upon two factors: (1) equipment; and (2) the method of inducing anesthesia.

The irksomeness has been greatly reduced by the improvement in the equipment. During recent years numerous syringes of most excellent design have been developed. The self-filling feature is of decided advantage. The writer has employed the Pneumatic Injector for over a dozen years and as one of the adjuncts of local anesthesia it ranks among the first in usefulness. To those who are unfamiliar with its use and advantages it may seem complicated but such is not the case. In fact, nitrous oxide machines may be said to be more complicated than this apparatus. The presence in the surgeon's hand of a solution of novocain under constant graduated pressure, with the cutoff as a control, makes the induction of local anesthesia a pleasure and reduces to a minimum the margin of error in covering the field with the solution.

The type of needles has also been greatly improved and one may now obtain needles of any desired calibre and length. A former constant source of trouble related to the adjustment of a needle to the syringe. This was usually a slow process making it difficult to exchange needles without delay and leakage was common. These factors have been overcome and so mark a great advance in the technic of the induction of local anesthesia.

The fact that our patients are conscious when operating under local anesthesia makes it essential that our equipment for this work be of the most excellent that it is possible to obtain. A smooth working machine with highly developed teamwork and the avoidance of all unnecessary "fussing" while preparing the patient for the induction of anesthesia will go far toward removing the handicap under which the surgeon now finds himself when using this method. It is for this reason that the most simple methods available should be used in every instance in which they are not contraindicated. The preparation of two fields, one for the purpose of introducing the anesthetic outside of the field of operation as is demanded by paravertebral anesthesia, for instance, should be avoided whenever possible. Also, pain during the induction of anesthesia should be brought to the irreducible minimum.

Thus while regional anesthesia is theoretically most ideal, the bulk of surgical operations are performed in the localities which do not easily lend themselves to this method.

It is significant that those who developed and warmly advocated regional anesthesia have gradually narrowed its field and now employ either infiltration block close to the field of operation or, indeed, use direct infiltration in a fair percentage of cases. Thus we find in the most recent monograph appearing on the subject of regional anesthesia, that infiltration "field" block has largely substituted paravertebral anesthesia for abnominal work, whereas the same author two years earlier was a staunch advocate of paravertebral anesthesia.

The same author we find recommends direct infiltration in conjunction with regional anesthesia in anesthetizing for thyroidectomy, and even direct infiltration is recommended in the case of cholecystostomy and cesarean section.

To the less expert, to the general surgeon whose experience with local anesthesia is comparatively limited, to the younger surgeon who is developing the technic of local anesthesia, the method of infiltration anesthesia will make a much stronger appeal than will the various forms of regional anesthesia in the class of cases designated.

The writer can, perhaps, best illustrate his reasons for taking this position by referring to a concrete example. Take, for instance, the anesthetization of the abdominal wall at the linea alba, above the navel; "field block" (LaBat) or what we have chosen to call infiltration block, demands infiltration anesthesia along the edge of the rectus on each side and, in addition, a bilateral infiltration along the costal border. The introduction of the solution will, it must be remembered, be made at a point where the nerve bundles have not become subdivided and the carrying out of this infiltration must invariably be associated with needle-point contact with one or more of the thoracic nerves. It is well known that contact with those nerves results in a reaction extremely unpleasant to the patient. Again, should the solution fail to saturate any one of these nerve bundles completely, the area supplied by the branches arising from this bundle will retain sensation. Obviously this area will be much greater at the line of incision than at the point where the attempt to anesthetize has been made. This factor is responsible for a considerable margin of error in the method.

The next point relates to the amount of solution introduced. As stated above, it is desirable to reduce the amount of solution to a minimum compatible with obtaining satisfactory anesthesia. It may be said that the amount of anesthesia per cubic centimeter is approximately the same whether making direct infiltration or infiltration block. One must, therefore, in making the latter, necessarily use twice the amount of solution used in making direct infiltration. Furthermore, we must take into account the fact that in the case of infiltration block the total amount of the solution must remain in the patient's body and be absorbed, whereas, in the direct infiltration a considerable percentage of the solution escapes when the injection is made.

There are still other factors which might be mentioned in comparison. While not so important, the element of time and labor differs in the proportion of about three to one because, other things being equal, it requires a certain definite period in which to cover a specified area. The possibility of producing painful sensations is increased not only on account of the relative size of the nerves in these locations but on account of the greater size of the area which must be infiltrated.

It is well known that the less the diameter of the nerve fibers the more quickly and certainly will the solution saturate them. It is perfectly

obvious, therefore, that the direct infiltration meeting as it does the ultimate arborization of the nerve filaments offers the opportunity for obtaining a maximum intensity of anesthesia.

There are, however, two important advantages claimed for the indirect method which must be disposed of before direct infiltration can be accepted, notwithstanding its unmistakable advantages, some of which are detailed above. One of these is the inadvisability of injecting novocain solutions directly into the line of incision. The other is that infiltration block anesthetizes a broad area of the abdominal wall, thus giving greater relaxation of the parietes. There is no truer saying than "the proof of the pudding is in the eating." The writer has injected isotonic solutions of novocain along the line of incision many thousands of times. Crile of Cleveland carries out the same procedure thousands of times yearly. Other surgeons throughout the world make a constant practice of this procedure. Is it possible to assume that those of us who are daily making these direct infiltrations are having defective healing of our wounds? The writer has in innumerable instances, in performing dual operations, infiltrated one side and used the other as a control. So far no authoritative evidence has been presented that the vitality or healing powers of the tissues have been reduced in the slightest degree on account of the presence of novocain solution.

The continuation of the presentation of this argument represents the stubborn adherence to a fallacy based on theoretical grounds which experience has most thoroughly contradicted. As a matter of fact, when the time has arrived for the closure of the incision the solution has, as a rule, entirely disappeared from the tissues, leaving only a portion of the novocain in combination with the nerve cells, which combination produces an inert substance. Obviously, if the presence of novocain in the nerve tissues produces an inhibitory effect upon the healing processes this influence would be as active in the case of regional as in the direct infiltration anesthesia.

The next objection to direct infiltration relates to the relaxation of the abdominal muscles and here again experience with the two methods controverts most completely the hypothesis advanced by the advocates of regional anesthesia. An infiltration along the line of incision will, provided it is properly carried out, produce a relaxation fully as complete as will even paravertebral anesthesia. It is simply a question of sufficiently widely infiltrating the peritoneal tissues. In many instances this wide anesthetization is not necessary. The type of surgical procedure required will indicate its extent. For practical purposes it should be made approximately 5 cm. in width before the incision is completed. After opening the abdomen its width may be increased ad libitum directly under the vision. This effectually eliminates reflex response to traumatization provided the intraperitoneal work is carried out with proper finesse. Here again it may be said that "the proof of the pudding is in the eating." The literature shows that it is those who advocate regional anesthesia in abdominal work who are most prone to admit the necessity of employing general or intraspinal anesthesia in abdominal surgery.

In the writer's experience over ninety per cent of abdominal cases which have presented themselves at his clinic during the past seven years have been operated upon without using general anesthesia as an adjunct, and of these not more than fifteen per cent could have been classed as in any degree unsatisfactory, either from the standpoint of pain to the patient, or embarrassment to the surgeon, in the carrying out of an operation.

In conclusion the writer wishes to once more accentuate the necessity for simplicity of methods, the improvement in equipment and the development of surgical strategy which is demanded by the use of local anesthesia by those who essay to use the method.

THE USE OF THE DELAYED FLAP IN SECONDARY OPERATIONS ON THE PALATE AND ANTRUM*

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The greater number of patients with cleft palates who are operated on at the proper age obtain a complete closure and good functional results. Occasionally, however, partial failures occur even under the most favorable conditions. But many of the larger postoperative openings are due to the operator's lack of knowledge of the principles of

*Read before the Southern Minnesota Medical Society, Mankato, Minnesota, December, 1922.

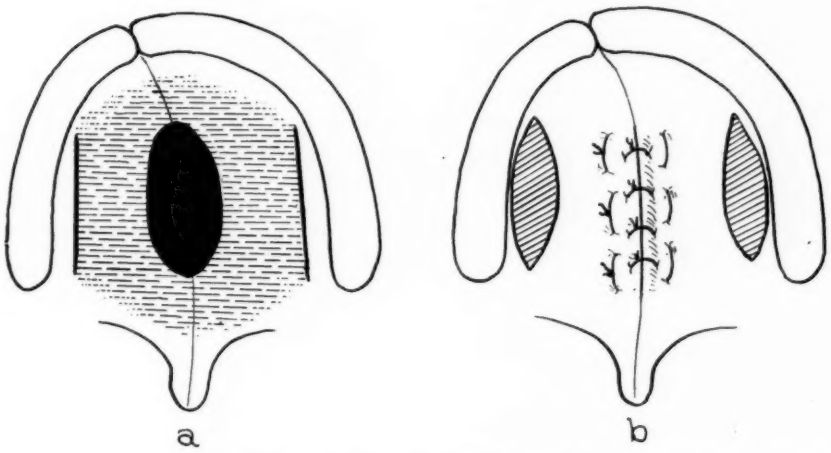

Fig. 1, a and b, In small openings with little scarring, the mucoperiosteum around the opening may be freed laterally, and the opening closed by means of lateral incisions and mattress sutures. The objection to this method is that the scarring around the opening is sometimes so marked and the tissue so inelastic that the mesial margins are brought together under slight tension and sometimes sloughing results.

cleft palate surgery. Such openings are usually in the hard palate or at the juncture of the hard and soft palates, and are sometimes closed with difficulty, depending on the size, location, and the amount of scarring present. It is in these postoperative, and the wide cleft palate cases, many of them double, that doubt arises as to the best procedure to follow, and in which I have found the use of the delayed flap so satisfactory.

It is best to wait at least three months after the first operation before attempting a second, as operations attempted immediately after the primary operation usually result in failure. In closing postoperative openings of the palate, tissue may be obtained from the palate itself or from other tissue, such as that of the cheek or the neck. In utilizing tissue from the palate, three types of flaps may be used. In the case of the small openings with little scarring (Fig. 1, a and b), the mucoperiosteum around the opening may be freed laterally, and the opening closed by means of lateral incisions and mattress sutures. The ob-

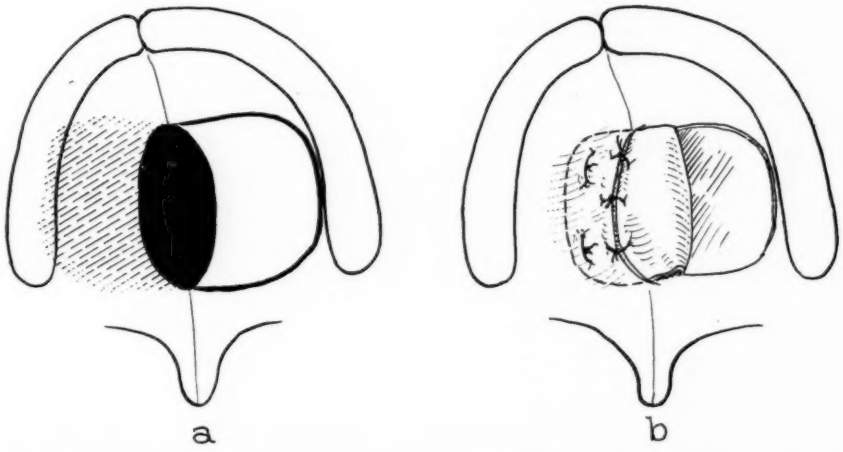

Fig. 2, a and b. Illustrate the closure of a postoperative opening in the palate by means of a flap with a pedicle along the mesial margin of the opening. The flap is turned hingelike and sutured underneath the freed-up margin on the opposite side of the palate. The scarred margins of the opening, however, make very poor tissue for a pedicle, especially when the flap is turned over on itself.

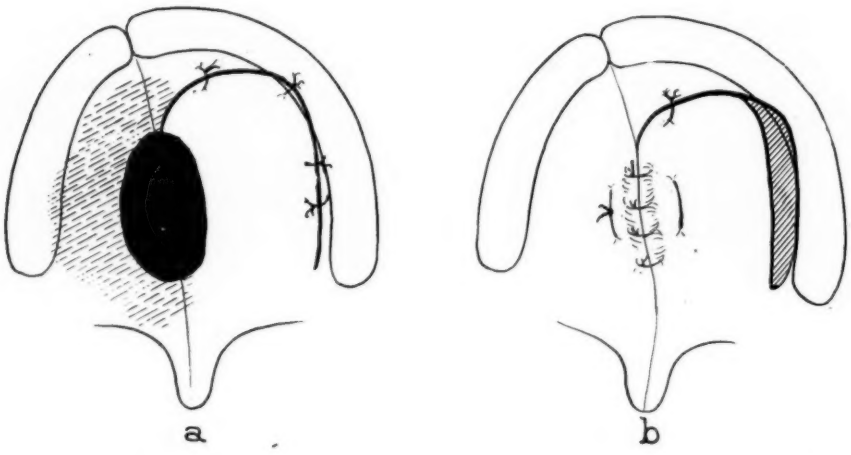

Fig. 3. The closure of a postoperative opening of a palate by means of a delayed flap with pedicle posteriorly. a. The flap has been elevated and sutured back in place; at the same time the opposite side of the palate is freed up. In a week the flap is again elevated, the mesial margins are pared, and then sutured together as shown in Fig. b.

jection to this method is that the scarring around the opening is sometimes so marked and the tissue so inelastic that the mesial margins are brought together under slight tension, and sometimes sloughing results. In other cases (Fig. 2), closure may be obtained by making a flap with a pedicle along the margin of the postoperative opening, turning it completely over, hinge-like, and suturing it underneath the freed-up margin of the opposite side of the opening, as described by Lane. The scarred margins of the opening, however, make very poor tissue for a pedicle, especially when the flap is turned over on itself.

The Davis-Colley method is similar to Lane's. Flaps are obtained from each side of the palate. One flap has the pedicle along the mesial margin of the opening and is turned over, hinge-like. The other is long and narrow with the pedicle posterior. It is sutured over the other flap with the mucous membrane towards the mouth. The third method has been the use of a pedicle flap, with the pedicle posteriorly on the palate, brought across in a one-

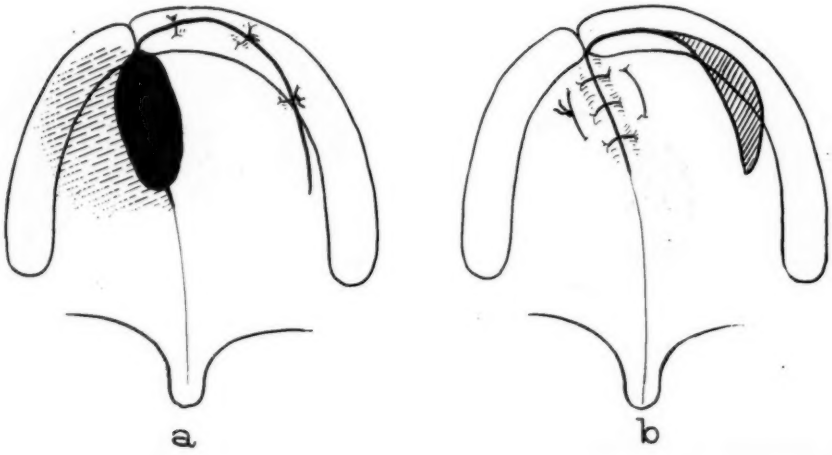

Fig. 4. The closure of a postoperative opening in the anterior part of the palate by means of a delayed flap. a. Shows the flap which has been elevated and sutured in place, at the same time the opposite side of the palate is freed up. In a week the flaps are again elevated and brought together over the opening. b.

stage operation with a mucous membrane surface towards the mouth.

The method which I have found most successful in the closure of both the large and the small openings is the application to cleft palate surgery of the principles employed in using the delayed flap in plastic surgery of the face and neck. It probably is not a new method as applied to the palate, although I have not seen anyone use it, nor have I seen it described in the literature. In bringing down a flap from the forehead to fill in an opening in the nose, or in using a flap from the back to replace scarring of the anterior part of the neck, I have found that it is best to raise the flap and then suture it directly back in place, leaving it for a week or ten days before transferring it to the area where it is to be employed. In this manner, the blood supply of the flap is insured and the flap also thickens. For cosmetic reasons, in closing openings around the nose or cheek, it is essential that the flap shall have skin on both sides. This is not necessary in closing openings of the palate, or the antrum in the mouth.

The same principles are applied to the closure of difficult postoperative openings in the palate. The flap is outlined on one side of the opening

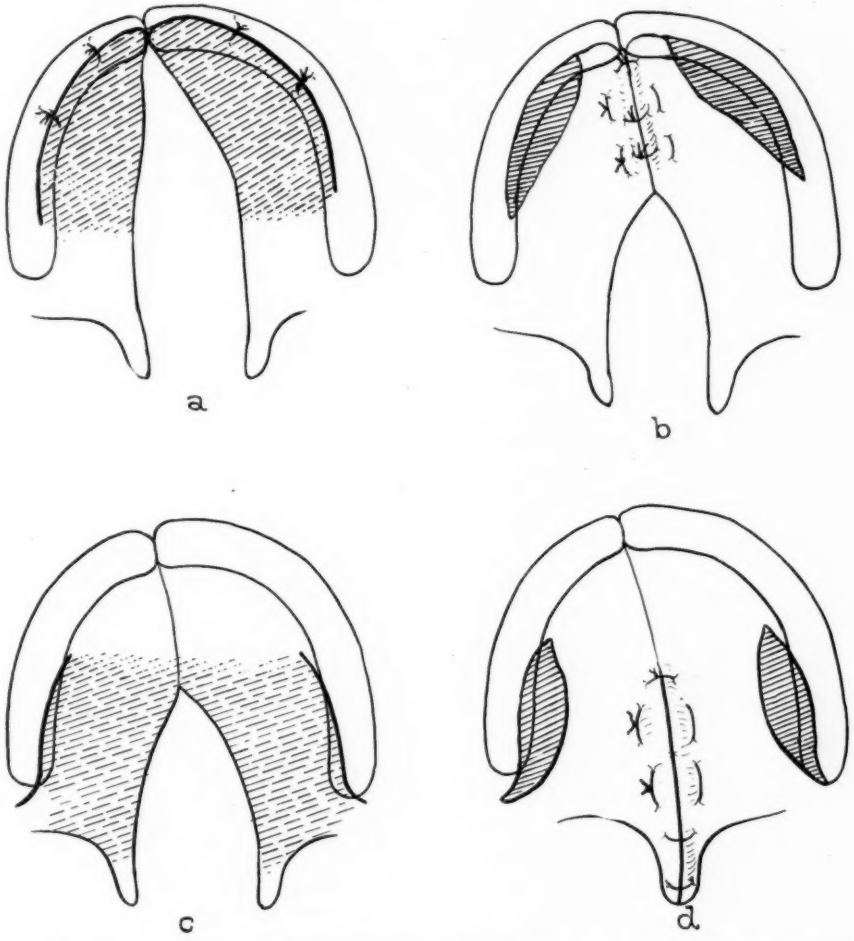

Fig. 5. The closure of a postoperative palate in which the opening is too wide and there is too much scarring for the usual Langenbeck operation. a. Flaps are elevated from either side of the anterior part of the palate and sutured back in place. The aponeurosis of the palate is not freed up at this time. b. The closure of the anterior part of the palate is completed one week later. c. Three months later the first stage of the second operation at which time the posterior part of the palate and the soft palate is freed up by lateral incisions, and after waiting a week the mesial margins of the flaps are pared and the palate closed in the usual manner.

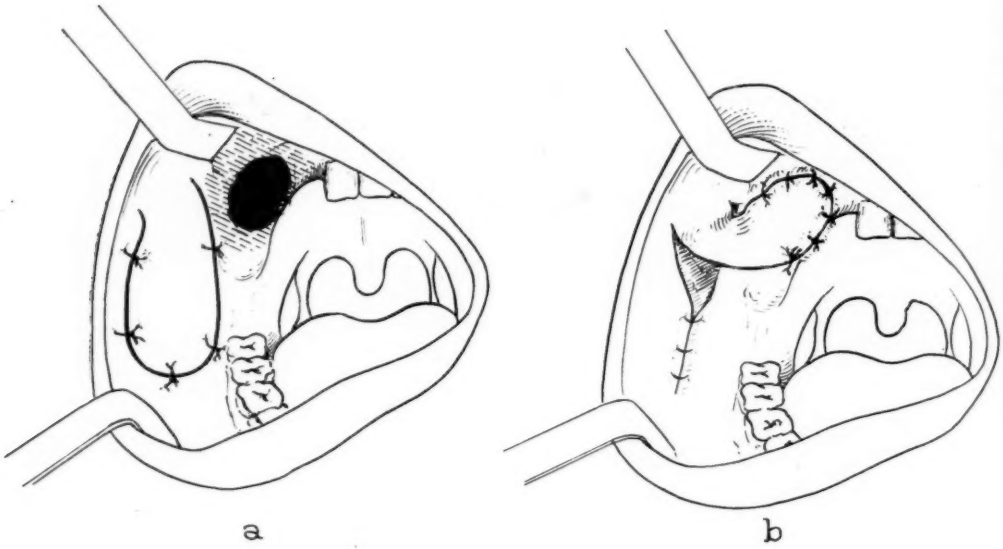

Fig. 6, a and b. Illustrate the closure of a postoperative opening in the antrum. The flap is elevated from the right cheek and sutured back in place. At the same time the mucoperiosteum about the opening of the antrum is freed up. In a week's time the flap is sutured in place around the opening as shown in Fib. b.

with the pedicle posterior, and then elevated and placed back in its original bed. At the same time, the opposite side of the opening is elevated from its mesial margin and allowed to fall back (Figs. 3 and 4). A suture or two may be employed to hold the anterior extremity of the flap in the correct position. In a week's time the flap is again elevated, the mesial margin trimmed and sutured across the opening to the freshened and elevated margin of the opposite side. During the week of the delay the blood supply to the flap is improved a great deal and the flap becomes thicker. In the second stage, minute areas of slough, if present, are trimmed off as the margins are freshened.

In case the original opening is very large, or the postoperative complete cleft palate is very wide, with marked scarring, the closure may have to be accomplished in two stages (Fig. 5). That is, the anterior part of the palate may be closed by delayed flaps from each side in the first stage. The aponeurosis of the palate is not freed at this time. Three months later the closure is completed by the two-stage Langenbeck operation.

Brophy has recommended the extraction of the deciduous molar teeth, allowing the sockets to heal, and then by lateral incisions in the cheek, getting a greater quantity of tissue to slide across the opening in the palate.

Monnier recommends the use of the two-stage operations for all cleft palate cases, waiting five days to a week after the elevation of the flaps before suturing them.

Blair has recommended elevating the palate from lateral incisions, leaving the mesial margin of the palate intact and then packing these pockets with 10 per cent solution of colloidal silver gauze for a few days before completing the elevation, and suturing. He has obtained very satisfactory results in these difficult cases by this method.

Lane also performs the operation which he has described, in two stages. Blaisus, Thiersch, and Rotter have used flaps from the neck brought into the mouth to close openings in the palate where tissue from the palate was not sufficient to close the opening.

In closing postoperative openings in the antrum following osteomyelitis of the jaw, the removal of malignant growths, or a Denker operation, the same procedure is employed (Figs. 6 and 7). The flap is elevated from the inside of the cheek with the pedicle high and is then sutured back in place. At the same time the margins of the opening are freed. After a week, the flap is sutured in place around the opening. The pedicle may have to be cut in a week or ten days and replaced to the cheek, although this may not be necessary if the base is close to the opening.

CONCLUSIONS

The results of this method of closure of postoperative openings in the palate and antrum have been much more satisfactory than any other method that I have used. Cases of cleft palate which I formerly felt were better taken care of by means of a plate, and cases in which mucoperiosteum is very thin, may be closed by the delayed flap. I do not mean that all cleft palate cases are made operable by this method, but it has added to the operable group many cases that were not benefited by previous operative procedures.

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8. Thiersch: Quoted by Blair.

DISCUSSION

Dr. H. P. Ritchie, St. Paul: I think this is a most important communication as it deals with what I feel is a most debatable field as to procedure, and the most difficult one of accomplishment of any reconstructive work in the body. I am a great admirer of Doctor New's work and also am familiar with the literature and can support his statement that this is a new proposition in regard to this work. The delayed flap has become an established thing in plastic surgery elsewhere and I believe it can be used in this locality. The work and teaching of Gillis, of England, Blair and Davis indicate that along lines of plastic surgery we have the greatest chance for improvement. I have looked over Doctor New's paper and I think it possible we may have here a suggestion that will be more or less revolutionary in our conception of cleft palate surgery. We have in the past been attempting whole palate operations on any kind of a palate that came along and it seems to me that we must differentiate palates, particularly as regards selection of procedure. This is one of the reasons we have been fussing so much over this classification in order to separate these palates. There is one palate, which I am pleased to call the bilateral alveolar cleft palate, which I have never been able to entirely close at the first sitting. So we have this great debate as to whether we shall continue on with whole palate operations or make selective operation for partial palate procedures. The flaps that I have turned have been the Lane flaps, and I have made an observation that the denuded area on the hard palate will reconstruct itself and in about six weeks or so it will be impossible to tell from where the flap has been taken. In cases where the flap has failed I have turned a second flap from exactly the same area with primary result, that is, using newly formed tissue. This is a delayed flap but not in the sense of Doctor New's suggestion.

I think we must differentiate between the soft and hard palate in our procedures. Monnier suggested that we raise the whole palate and suture it at a later date, but he did not differentiate between hard and soft palates and consequently the subsequent results were very discouraging. I feel sure that flaps applied to the soft palate are unnecessary and unsurgical and that these procedures must be limited to the hard palate.

Cutting off the blood supply of the hard palate is the thing that gives us loss of tissue and in our operations we take the risk of destroying both the anterior and posterior arteries. It would be an ideal thing to reconstruct our soft palate, raise up the posterior part of the hard palate as a first operation. After several months the posterior blood supply will surely recover. Then as a second procedure we will be justified in cutting free the flap from its anterior blood supply. This would allow wide mobilization and solve the greatest question of this subject, the postoperative hole of the hard palate. All this requires study but the suggestions fit in with experiences elsewhere. Doctor New suggests this as a secondary procedure for postoperative holes but, if proven, then there are possibilities that it may substitute whole palate operations and thus become a primary step.

Dr. Carl W. Waldron, Minneapolis: Doctor New has given us an important contribution to the ways and means of diminishing the hazard of cleft palate operations and I cannot too strongly endorse what he has said about the necessity of waiting at least three months between operations.

I had the opportunity in England of seeing a great number of cases of traumatic palate perforations from war injuries and we were there brought face to face with all

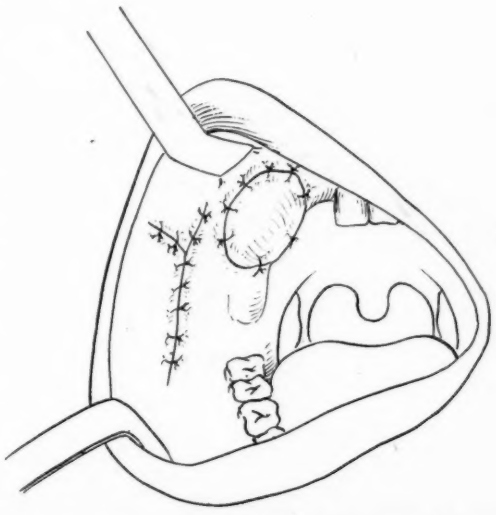

Fig. 7. The pedicle has been replaced to the cheek and the closure of the antrum opening completed.

sorts of diversions of the blood supply and had to devise flaps which in some measure resembled what Doctor New has put before us today in order to close the perforations. We found that the older methods did not give us the results that we wished and we modified them by using the flap operation with the pedicle situated posteriorly where possible. We felt, however, that we could do it in one stage. At the same time we were doing delayed flap operations in our other plastic surgery about the face and chest particularly, using the various types of flaps. We did not feel that putting a delayed flap back on denuded bone would increase the blood supply as much as Doctor New seems to feel takes place. We did not try it out, in fact we felt that if we judged our blood supply, particularly if we took into consideration the original scar, the original wound, we could be sure of an ultimate result providing the flap was wide enough.

In the large antral perforations it is necessary to use the hinge flap, usually from the cheek.

I agree with Doctor New in what he feels about the Lane operation, and that his operation by a posterior wide pedicle permits a much greater blood supply for the flap than where the flap is hinged over an area at the margin of the perforation where previous operations perhaps have resulted in considerable scarring. Undoubtedly the blood supply at the margin is deficient and it is far better to have a long flap attached posteriorly with a blood supply that is assured.

With reference to this delayed flap, I wonder why Doctor New feels that the blood supply is helped by putting it back over denuded bone? I should think it would perhaps be a little better at the first operation to free up the hard palate, leaving the flap attached posteriorly where a pedicle is used, and also partially attached anteriorly, perhaps outlined, or left partially attached laterally in order to increase the blood supply. I have used the delayed flap in all other types of plastic surgery. In rhinoplasties, where we were able to judge the blood supply quite well we did not feel that the delayed flap was necessary. Furthermore it does thicken the flaps and in some types of plastic surgery one undoubtedly wants to keep the flap as thin as possible. However, I do feel that what Doctor New has put before us today will perhaps revolutionize the treatment of cleft palates because this has been a bugbear in the past for those doing the work and if anything can be done to increase the blood supply and otherwise insure successful healing it should be carried out in order to obtain the best possible result.

Dr. G. B. New (closing): I did not attempt a full discussion of the causes of these postoperative openings in the palate. I am sure you have all read Doctor Ritchie's admirable paper on "Congenital cleft lip and palate," showing how each of these various types should be studied carefully. If the principles that he had outlined previously had been followed, many of these conditions would not have occurred.

In answer to Doctor Waldron's question I will say that, on account of the marked scarring and the inelasticity of the tissues, I believe that it is best to cut the flap across anteriorly, leaving the pedicle posteriorly; this allows the front part of the palate to come together more readily.

THE HEART IN CERTAIN OF THE SEVERE EXHAUSTING INFECTIONS*

Charles Lyman Greene, M.D.

St. Paul

Two statements may be regarded as axiomatic in the light of present knowledge: (1) that the heart is affected more or less profoundly in all acute *exhausting* infections; (2) that the heart disease of middle age represents in the main either the residual effects of acute infection, single or multiple, or the summation of intermittent or remittent bacterial toxemias, arising from the activity of chronic hidden septic foci—chief of which are the tonsils, gallbladder, sinuses and teeth.

Three chief groups are represented in chronic heart disease of the usual types:

1. That of endocarditis, with which one at its inception would never expect to find a normal myocardium and in which the condition of the heart muscle and not the valvular lesion per se is the factor of chief importance in the lifetime of the individual.

2. The diseases characterized by slowly progressive degeneration, or, far less frequently, a chronic low grade inflammation. True "chronic myocarditis" really is so rare that the term might almost be dispensed with entirely.

3. The third group comprises unstable, intermittently toxic, and more or less continuously or intermittently overstrained hearts, in visceroptotic individuals, in which the element of progressive degenerative change or low grade inflammation is not necessarily a factor. Such are the hearts which compose the greater part of the group which excited so much attention during the Great War, although Dr. Hartsborn of Philadelphia had well named the condition in the later sixties of the past century as "heart exhaustion" and Da-Costa, far less accurately, as "soldier's heart"—inasmuch as they are excessively frequent in the civilian population in all countries. This type of heart proved, as I had occasion to predict before we entered the field, one of the worst obstacles to efficient military selection and service during the Great War. The heart of this type exists in a host of individuals and may and does undergo in many

*Read before the Ramsey County Medical Association, St. Paul, November, 1922.

of these such development as enables its possessor to carry the ordinary burdens of life without serious inconvenience or discomfort; in others it remains always unstable, vulnerable, and lacking in reserve.

I shall not bore you to-night by any extended dissertation upon the insufficient "drop heart," which has been the subject of so many of my papers, since its clinical significance and importance was demonstrated by me in 1912. Let it suffice to say that its possessors appear to be peculiarly susceptible to acute prostrating and chronic intermittent infections as well as to depressed states of nutrition affecting myocardial tonus and that, by reason of its narrow diameter, it may and very frequently does, achieve a wide dilatation which escapes detection, as such, by the attending physician.

Such hearts when of the definitely asthenic type, with unstable tonus and reserve, are peculiarly and particularly dangerous to their possessors in the presence of acute prostrating infections of the kind producing toxins with an affinity for the myocardium—diphtheria, scarlet fever, variola, "trench fever," influenza and rheumatism, being notable examples. They also are unusually vulnerable to the toxins emanating from concealed septic foci.

All behave in general as do sthenic hearts with respect to the incidence of endocarditis, pericarditis and actual myocarditis, but their possibilities in the way of acquirement of minor insufficiencies and dilatations in toxemic states are far greater than obtain in the case of the sthenic heart.

All hearts are marvelously enduring and long-suffering. Were it not for this fact, heart disease as a cause of death would not only head the list, as it does to-day, but rise to appalling heights in the graphic chart, for at the present time a diseased heart must to a large extent operate automatically and unaided to maintain an adequate reserve and postpone an untimely break in compensation.

We have learned much during the past decade or two with respect to disturbance of heart function and little by little such knowledge is being passed on to the general profession, but we still have far to go before we can stand unashamed before the world or feel that we have even measurably discharged our duty to the actual or potential cardiopath.

I shall devote myself chiefly at this time to a consideration of the effects of certain common severe and exhausting infections upon the cardiovascular system and suggest a means of partial correction of certain dangerous tendencies in relation to the care of patients both during periods of infection and in and after convalescence.

Let us consider the heart in acute infections, not exclusively as seen upon the autopsy table or under the microscope in the laboratory, but as a delicate, highly complex, exquisitely regulated and adjusted living engine, one entitled to at least as much care, prophylactic, diagnostic and reparative, as is that of the automobile.

We do not wait for our motor car to break down before attempting its repair; we do try to recognize engine trouble before the motor stalls, and I would plead only for an equal amount of solicitude for an engine whose maintained efficiency means to its possessor either health, comfort and "length of days" or illness, discomfort and untimely death.

Even the gross pathologist admits now that "functional" disturbance may attain a high, dangerous, or even fatal degree without the concurrence of macroscopic or even miscroscopic changes in the cardio-vascular system at all adequate to account for the disturbance or termination of function. It is comforting to one who ventured this assertion many years ago to read now its iteration and reiteration by recognized authorities.

It is our duty as physicians to prevent as well as to alleviate and cure disease. With respect to the heart we find in the infections the actual source of nearly all serious diseases of the heart and we have no right to make the recognition of established, gross and palpable symptoms of heart weakness the standard of diagnostic efficiency in such cases or fail to protect our patients from both the immediate and remote effects of bacterial toxins by proper precautions during and after the period of infection and toxemia. At present, with rare exceptions, we must plead guilty to both counts of the indictment.

In the care and protection of a heart already functionally impaired or crippled we must seek primarily the maximal rehabilitation or restoration of myocardial reserve.

In the presence of an acute infection of the exhausting type we know that reserve at least is threatened if not the structural integrity of the neuro-muscular cardiovascular mechanism, and it

becomes our duty to detect the earlier and minor evidences of functional impairment.

We cannot see a myocarditis; we cannot affirm positively its absence or its presence, but we can and ought to detect symptoms of cardiac weakness before they reach a high grade.

Whatever may be the actual lesion present in any given heart—whether endocarditis, myocarditis, degeneration, congenital inadequacy of structure and function of toxemia alone—lacking gross or extensive structural changes, it is the determination of the integrity or impairment of heart-muscle function which is the paramount issue.

The methods usually depended upon at this time, almost universally, for the detection even of actual decided or gross dilatation of the heart are misleading, fallacious, and inadequate to fulfill the demands of effective and scientific medical treatment.

Skilful and timely diagnosis is not merely the handmaiden, but the indispensable prerequisite of effective therapy.

Chronic structural disease of the heart, as stated, depends almost wholly upon previous and past or repeated recurrent or intermittent infections. These vary greatly in their effect and in the frequency and selective sites of attack upon the cardiovascular apparatus, as also in the transient or enduring quality of the damage primarily inflicted.

The development of chronic disease of the heart muscle itself is, in the great majority of instances, extremely slow, whether it be primary or secondary, associated with the juvenile endocarditic lesions, nonendocarditic but subject to the accelerations imparted by recurrent low grade toxemia, persistent or recurrent overstrain, or the added burden of arterial hypertension and arteriosclerosis.

We cannot hope to follow it throughout its course in many instances or detect it as early as we would like to do, but we can and should detect it far earlier than we do at the present time—even lacking such invaluable aids as some of us are fortunate enough to possess in the polygraph and electrocardiograph.

To achieve this we must understand and evaluate properly such expressions of limitation of heart reserve as manifest themselves in subjective symptoms associated or not with non-endocarditic valvular leakages expressed in systolic bruits or first sound impurities such as are termed too often "accidental" and, too generally, held to be negligible. We must watch for and detect variations in the heart sounds, in the area and diffusion and character of the apex beat and by modern improved percussion, reinforced by roentgenography when possible, determine the presence or absence of enlargement of the heart.

It is well to remember in this connection that hypertrophy causes no massive heart enlargement, and aortic stenosis, the lesion best showing an almost pure hypertrophy, may require years for the development of any marked increase in outline.

It is dilatation, with or without hypertrophy, that extends the heart borders to any very marked degree and this in endocarditic valvular lesions is obligatory and relatively negligible, if combined with hypertrophy and unassociated with subjective or objective symptoms of impaired myocardial reserve.

An adult dilated ptotic ("drop") heart in diphtheria measuring only 11 cm., or less, in total transverse diameter may be far more serious to its possessor than a 20 cm. heart associated with compensated, subjectively symptomless, endocarditic aortic and mitral disease or even a myocardial degeneration, lacking endocarditis.

A murmur so loud as to be autoaudible and heard "at distance" may be far less ominous than a soft systolic murmur developing at the apex during diphtheria or acute rheumatic arthritis.

A point of maximum impulse that is shifting outward hour by hour may be, and often is, the precursor of death in diphtheria and a mere diffusion of the apex beat in any acute infection is a warning and a precautionary signal. One must not wait for striking symptoms of decompensation in such cases.

Changes in the first sound at the apex—making it unduly sharp, soft, distant or murmurish—are things to be weighed and noted.

Increasing pallor, with or without cyanosis, an unwillingness to move, or be moved, epigastric pain and tenderness, resistance to pressure, or tenderness, over an hepatic border in the severe acute infections have a significance similar to, but often greater than, the appearance of arrhythmia or excessive tachycardia.

Above all things the practitioner should remember that the nipple is no guide in the determination of a normal heart outline and even the midsternal line is a deceptive landmark.

Normal hearts are small or large according to the structural type of their owners and vary in practice form 7.5 cm. to 14 cm. in total transverse diameter.

The old flat-finger percussion, the classic landmarks, and the current dicta as to normal heart dimensions are hopelessly out of date.

In our forced reliance upon subjective symptoms, subjective weakness, precordial oppression, atypical apex murmurs, subjective or exertion-dyspnea, heart-sound variants and abnormal accentuations we shall err occasionally. In adherence to old methods and traditions we must and do blunder often and inexcusably.

Remember also that manually demonstrable arrhythmia is not the rule even in the decompensated, degenerative lesions of middle age and relatively rare in toxic or congenital inadequacy. I have heard it said that all cases of so-called chronic "myocarditis" showed an irregular pulse; as a matter of fact, only the small minority do show it.

The electrocardiograph and polygraph reveal many disturbances of rhythm undeterminable by palpation and this is particularly true of lengthened conduction-time (partial heart block) so commonly encountered in acute infectious disease as well as in the chronic heart disease of middle age.

It is myocardial tonus which is most important to the individual owner and next to that perhaps comes a conduction-time at least relatively normal.

Suddenly developed arrhythmias such as paroxysmal tachycardia, fibrillation and flutter are attended in acute infections by coincident heart dilatation or an increase of a preexisting one. Normal rhythm obviously is important to a toxemic heart.

Tonus is impaired easily and by many conditions, especially in the asthenic drop heart.

From clinical observation it would seem that it can be diminished to an extent sufficient to produce marked decompensation without a coincident dilatation of decided and demonstrable degree. Ordinarily, however, in the absence of a high grade of hypertrophy the marked decompensation of myocardial atony is associated with a demonstrable dilatation.

Minor insufficiency may or may not be coincident with determinable enlargement, but even mental shock is capable of producing sudden acute, massive dilatation and syncope.

The first effect of myocardial toxemia in acute or chronic infections is a reduction in tonus.

If we consider certain of the acute infections we find wide variations in the degree of myocardial toxemia ordinarily encountered. True chronic myocarditis apparently obtains very rarely after typhus fever, pneumonia, measles, scarlet fever, or even variola—yet in these diseases the heart-tonus may be profoundly affected and relative incompetence may persist for a considerable period after the active toxemic stage is passed and be shown by persistent weakness or lethargy, exertion-dyspnea, impure, weak, or distant heart tones and bradycardia or tachycardia.

Acute myocarditis is rare in the commoner infections except acute rheumatic arthritis, severe variola, and diphtheria; yet damaging toxemic results are common during and following many other infections.

Incidentally it is to be hoped that the old idea that sudden death in severe infections is due to primary sudden vaso motor paralysis, will be relegated to the list of exploded theories.

It should be remembered also that the apparent severity of a given infection is not a measure of the degree of heart involvement, either present or possible, and that the problem is not limited to any degree of actual structural myocardial damage present in the given case but is extended to include residual damage such as can be determined only by careful watching in convalescence and occasional observation long thereafter. Even a mitral stenosis may not be clinically demonstrable for months after recovery from the causative acute infection.

In *scarlet fever*, severe decompensation, dilatation and temporary mitral leakage are very common, but seldom permanent or fatal. The lesser insufficiencies are almost invariably present in cases of any severity. Residual damage to the endocardium is relatively rare, if cases are managed properly in convalescence as well as during the acute stages.

It is especially necessary to note and beware of the prolongation of the rapid pulse into convalescence, a failure of heart sounds to attain normality in tone and accent, prolonged physical weakness and inertia, or decided persisting or increasing diffusion or displacement of the apex-beat.

In severe *smallpox* the heart is affected decid-

edly, always myocardially, and marked mitral murmurs of relative insufficiency are common.

True endocarditis, pericarditic and pancarditic complications are rare but serious when present. Care in convalescence is essential to full recovery from the myocardial effects and patients must be protected from involuntary overstrain.

In *typhoid fever* sudden death from the heart is rare, yet myocardial weakness, slow in development, is profound and myocardial changes are decided.

The apathy and profound prostration present are in a measure protective to the crippled heart. The relative bradycardia is not affected by atropine and its appearance though due to myocardial toxemia is a more favorable omen than its absence in proven typhoid fever.

The heart dilatation so generally present in "typhoid" is maximally left ventricular in most instances. Relative mitral insufficiency is a common finding after the disease is fully established and soft distant tones the rule.

The tendency to progressive heart weakness is to be remembered and the patient carefully safeguarded both during the attack and throughout convalescence. An acute myocarditis with frank evidence of critical heart weakness may develop at any time during the active stage though it seldom appears early save in ambulant cases.

Paratyphoid fever affects the heart similarly but less severely.

Watch with special care the heart that fails to show relative bradycardia in typhoid fever, is arrhythmic, or carries a rapid rate into convalescence.

With respect to *influenza* I can only say that despite a few opinions to the contrary I regard it as an infection extremely damaging to the heart and one of the most frequent causes of permanent myocardial damage, especially in middle and old age. Frank myocarditis with extreme decompensation symptoms is rare, even in pneumonic cases, but myocardial toxemia is profound in severe cases and oftentimes also in those of an apparently minor type.

Returning from army service in 1919 to a practice devoted almost wholly to diseases of the heart, blood vessels and kidneys, I found at least two-thirds of the new cases presenting during that year and that of 1920, dated their symptoms from influenzæ attacks, many of which were described as of only a few days duration.

Making due allowance for the factor of skeletal muscle degeneration which may be noted at autopsy in some cases, the sudden profound weakness of this disease is characteristically that of myocardial toxemia of a type peculiar in its rapid effect upon heart tonus.

Bradycardia is suggestively frequent during convalescence; tachycardia common and often unduly persistent over long periods.

I know of no disease, acute rheumatic arthritis not excepted, in which so much persisting myocardial damage results from lack of proper management in convalescence. Its effect in relighting the old myocardial tonus deficiencies of middle age and accelerating myocardial degenerations is very striking.

Endocarditic lesions are rare; actual myocarditis uncommon.

The tremendous number of people attacked in pan-epidemics is, of course, to be considered, but so also is the tremendous mortality of its pneumonic form. Of especial myocardial significance was the frequency of relapses into the fatal pneumonic form when patients attempted to remain active or resumed activity too soon in apparently simple and trivial cases. No disease requires more careful handling in convalescence or repays it better. Persisting bradycardia, tachycardia, weakness, arrhythmia, syncopal tendency, angina, diffuse apex-beat, abnormal heart sounds are danger signals not to be disregarded.

The danger in convalescence is not from death or the development of an acute structural change myo-, peri-, or endocarditis although these may occur, but rather of the establishment of a prolonged period of myocardial atony, the initiation of a myocardial degeneration, or the relighting and acceleration of a pre-existing disability.

Diphtheria is a strange example of an infection which hits the myocardium hard, yet seldom leaves lasting damage when it fails to kill.

In all cases of any severity the heart function is affected and in many the symptoms are frank, outspoken and deadly. The more severe decompensation and dilatation may come early, but usually appears late, commonly during convalescence, and recovery or death occurs within a week after the onset of outspoken symptoms and frank physical signs.

The heart must be watched at all times and especially as the infection is subsiding. In this as in every other severe infection the heart should be checked up every thirty to sixty days after recovery apparently is complete until six months at least have passed.

The naso-pharyngeal cases are most prone to serious or fatal heart complications and laryngeal cases least. Sudden death from the heart may occur as late as thirty or even sixty days after the onset of diphtheria. In the case of a badly damaged heart seen during the past few days, severe life-threatening decompensation appeared six weeks after the onset. In this as in certain other infections the apparent subsidence of the toxemia does not remove the danger of cardio-vascular collapse.

The symptoms of extreme established myocardial weakness are strikingly objective, but are preceded usually by minor signs not to be disregarded and of the utmost importance in the saving of life.

Tachycardia, excessive, persisting, or renewed after a drop in pulse rate, is a danger signal, as is also increasing pallor or greyness—even lacking cyanosis. Voluntary immobility and aimless restlessness alike are ominous symptoms.

Extreme weakness and profound debility in convalescence, precordial or epigastric oppression, tenderness along the liver margin or over the heart may precede actual descent of the hepatic border and the exhausting vomiting so commonly observed in extreme decompensation and dilatation.

The apex-beat may be diffuse; the finger-point area of maximum impulse may be found to shift outward; abnormal pulsation of cardiac rhythm may appear over and near the precordium. Changes in the first sound with or without bruits must be noted; gallop rhythm, actual heart block, flutter or fibrillation may be present or the type of arrhythmia may change from time to time. The lability of the pulse may be suggestively increased.

The heart border should be percussed carefully at each visit. As stated, diphtheritic heart failure runs its course to recovery or death in a few days. The mortality under present methods in cases showing decided heart involvement exceeds 50 per cent. This figure surely can and ought to be lowered. The recovery is rapid and is usually complete, but cases must be brought slowly and carefully into physical activity and watched for several weeks, as late reinvolvement may and does occur.

In this as in all serious cardiac involvement in the acute infections, all possible limitation of voluntary movement must be secured. The patient must be disturbed as little as possible, be turned and moved passively and the head must be kept low so long as any symptoms of marked cardiac weakness persist.

I cannot attempt to discuss the heart in acute rheumatic arthritis, the generator of that toxin most inimical and damaging to the myo-, peri-, and endocardium, the most enduring in its effects and, unlike the immunity-conferring diseases, prone to recur and be more dangerous with each succeeding visitation.

The myocardium is always affected markedly in acute rheumatism, though endocarditis may be the declamatory and vociferous lesion or a precarditis may exist alone or be superadded to form a pancarditis.

The toxemic disturbances of the heart may be transient or long persisting and even after apparent recovery a degenerative change initiated by the attacks may progress intermittently or persistingly, though very slowly, and this may be fed and accelerated by streptococcus strains bred in the depths of infected tonsils—ideal incubators of pathogenic micro-organisms.

Over a decade ago I called attention to tonsillitis as an almost invariable precursor of acute and subacute rheumatic attacks. The process seems to be a slow sepsis, from one to three weeks elapsing between the sore throat, often trivial, and the onset of joint symptoms. The long delay seemingly had prevented any general recognition of the clinical sequence.

In children I have seen death from heart failure following tonsillitis with frank rheumatic symptoms almost wholly absent. In them the joint symptoms often are trivial or apparently wholly lacking, yet most serious cardiac complications may arise.

Endocarditic lesions are usually frank and outspoken; pericarditis may or may not be; myocardial damage is masked and hidden and even marked dilatation, under present methods, is often undetected.

I need not emphasize the importance of careful watching during convalescence and occasional later observation thereafter for a period of at least one

year, in the interest of the patient and of the credit of the physician.

Mitral stenosis and aortic stenosis for example are slow in development and many months will be required before the heart of a rheumatic case, apparently unscathed by the attack, can be declared normal.

I cannot attempt to deal with the heart of pneumonia and indeed the subject merits a special paper. The subject of cardiac syphilis also is too large for present discussion. No disease is more important in relation to chronic cardio-vascular disease. We know now that not alone is the aorta attacked early but that the disease is peculiarly selective for the blood vessels from the largest trunk to the tiniest arterioles and that the coronary system itself is frequently involved. Moreover Warthin found every case coming to autopsy showed evidence of interstitial myocarditis. Indeed marked myocardial weakness may and not infrequently does accompany the secondary stage of this protean infection.

I shall not longer tax your patience, great as is the temptation, for the field is unlimited. In closing I would emphasize the following points, viz:

1. Demonstrable disturbances of heart strength and myocardial insufficiency occur in practically all severe prostrating infections.

2. The importance of the recognition of such toxemic effects is manifest in view of the frequent crippling effects produced, residual damage created and actual deaths encountered.

3. This recognition to represent full value to the patient must be based upon the detection of minor no less than major signs of impaired myocardial tonus and reserve.

4. It must include also the ability to detect progressive dilatation in its lesser and earlier stages.

5. This demands a knowledge of the wide variation in the size of the normal heart and a recognition of the fact that commonly accepted landmarks and flat finger percussion are of little value.

6. The importance of determining and recording the position and character of the heart borders, the point of maximum impulse, and the character of the apex-beat at each visit, should be better understood, as well as the clinical value of variations in the quality and rhythm of heart tones and the subjective symptoms of the patient.

7. The patient is entitled to and should receive most careful observation not alone during the onset, height, and subsidence of an exhausting infection but also throughout a deliberate and systematically ordered convalescence.

8. In the case of the severer acute infections and in all cases of acute rheumatic arthritis, occasional examinations of the heart should be made during a period of several months following apparent recovery.

9. Investigations conducted in our military hospitals following the Great War, showed that the time allotted to convalescence from acute infections should have been doubled. It would be a means of saving many lives if a like added term could be introduced into civilian practice.

I stop here with an apology for what may seem an over-critical paper. If it so impresses you, I must plead my intense interest and profound convictions as my justification and direct your attention to the fact that whatever of criticism it does contain, is constructive and not destructive.

THE DIAGNOSIS AND TREATMENT OF URETERAL CALCULI*

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Clinical observation and animal experimentation demonstrate that infection plays a major rôle in the production of renal stones. A careful study of the histories and clinical findings of fifty patients with ureteral stones reveals infection present in 75 per cent. In 70 per cent infection was found in the teeth, tonsils, sinuses, etc. I was unable to ascertain the presence or absence of infection in 17 per cent of the patients studied because in these instances I was acting as a consultant so that complete clinical evidence was not available.

Localization.—Seventy to seventy-five per cent of renal stones pass from the kidney. About 40 per cent are found in the right ureter and 30 per cent in the left ureter. Ten per cent are bilateral. Stones are found in males three times as often as in females. Eighty per cent of stones found in the ureter are within the lower third, a few lodge in the middle third, and about 15 per cent are found at the uretero-pelvic juncture.

*Presented before the Annual Meeting of the Minnesota State Medical Association, Minneapolis, October 12, 1922.

DIAGNOSIS

Methods of diagnosis have increased and improved very much during recent years. If ureteral stone is suspected, data obtained from urinalysis, roentgen ray, cystoscopy, ureteral catheterization and pyelo-ureterography is necessary before a diagnosis can be made.

Many needless pelvic and abdominal operations are performed from which the patients receive no relief because a ureteral stone is not considered in the differential diagnosis of pelvic and abdominal lesions. I find that one patient in four with right ureteral stone has had some previous unnecessary operation.

Symptoms.—Pain is the most prominent symptom and appears in about 98 per cent of all patients. Dr. John B. Murphy taught that ureteral calculus must be thought of when considering the cause of any abdominal pain. The radiation of the pain may be variable. In the majority of instances pain is referred to the renal area but may be referred to the upper abdomen, to the mid-abdomen, or to the appendix area. In many instances, it is referred to the lower ureter, to the bladder, and to the testicle. The position of the calculus has some effect on the pain radiation. Stones found in the upper ureter may have pain radiation to the testicle, to the bladder, and sometimes to the appendix area. A stone in the lower ureter usually causes pain in the upper abdomen or renal area.

The size and contour of ureteral calculi have some bearing on the character of the pain. A stone with a ragged outline will produce very severe knife-like pain, whether large or small, while a round and smooth stone of any size may pass through the ureter with only slight pain or aching.

The onset of pain with ureteral calculus may be sudden or insidious. The first attack is usually severe but may be only a noticeable ache in the back or side.

The passage of a ureteral stone may be silent. Pain may come in paroxysms or may be continuous. The mechanism which propels the stone through the ureter is a combination of back pressure of urine and contraction of the ureter. When the calculus is arrested at any point in the ureter, pain becomes chronic and is described by the patient as "a constant ache." If urine in sufficient quantity can pass the stone, the pain may partially or entirely subside. Pain may be absent for days or months when a stone remains in a dilated portion of the ureter where it produces no obstruction, but appears as soon as the calculus re-engages in the undilated ureter and continues its progress. Sudden cessation of pain may indicate that the stone has passed through the ureter into the bladder.

Tenderness is noted in the majority of instances in the renal area and is probably due to the distention of the kidney pelvis and subsequent intrarenal pressure. Murphy percussion is positive but is not a differential point between renal or ureteral calculi and other renal lesions. Tenderness over the appendix area or over the lower ureter may be present. Frequently this has led surgeons to remove a normal appendix when a ureteral stone was present. There may be general abdominal tenderness.

Tumor may be present, particularly if the attack has been a prolonged one or a chronic condition exists. The tumor is usually a hydro- or pyonephrosis. In the acute cases the kidney is very tender but enlargement is not usually found.

Vesicle irritability is noticed at some time during the passage of a ureteral stone in approximately 80 per cent of patients. This sign frequently assists in the differential diagnosis from other abdominal or pelvic conditions. When the stone is in the upper ureter this symptom may not be present. As the stone approaches the bladder, vesicle irritability increases. When a ureteral stone is situated in the bladder section of the ureter, irritability is most marked. If a stone completely obstructs the ureter, vesicle irritability is not frequent unless the obstruction be in the bladder section of the ureter. Patients complain more of frequency of urination than of burning. When a stone is in the bladder section of the ureter or in the ureteral meatus stranguary may be noticed.

Urinalysis.—Catheterized bladder specimens should be obtained whenever possible. Pus or blood cells in the urine should cause the physician to search carefully for a stone or other urinary lesion but the absence of pus or blood cells does not preclude the absence of stone. A stone may entirely obstruct the ureter so that no urine is passed into the bladder from the suspected side. Gross blood or pus or both in the urine are of definite diagnostic value but alone or associated with pain are insufficient evidence upon which a diagnosis of ureteral stone may be made. Gross blood occurs less frequently with ureteral stone than with renal stone. This symptom may be the only one noted by the patient indicating trouble in the urinary tract.

Gross pus indicates a severe secondary infection with probable kidney damage. Daily examinations of the urine are necessary if we expect to find the few blood or pus cells which are usually present at some time and which help so much to clear up a diagnosis concerning which we may be in doubt. A specimen obtained after a recent attack of pain will contain blood or pus cells when specimens obtained at other times may be negative.

Nausea and Vomiting.—In certain patients vomiting is uncontrollable and occurs as long as the ureter is obstructed. Severe vomiting is not frequent although vomiting at some time during the history of the trouble is the rule. When vomiting is continuous, lesions of the gastro-intestinal tract must be thought of as co-existing with stone or as the sole cause of the symptoms under consideration.

Reflex Ileus.—In three instances, the finding of a shadow in the roentgenogram during a routine examination prevented me from exploring the abdomen for intestinal obstruction. The patients had abdominal distention together with vomiting and obstipation for several days.

Palpation.—Bimanual palpation for a low ureteral stone, either through the rectum or vagina, should always be attempted. As other conditions in the male and female pelvis may simulate a small hard object thought to be stone, one should be careful and not depend upon palpation alone as a means of diagnosis. In the female I have been able to palpate one in three ureteral stones that were near the bladder or in the bladder section of the ureter.

Roentgen Ray.—Although the frequent and more widespread use of the roentgen ray has greatly assisted in the diagnosis of ureteral stone, in many instances roentgenograms considered alone—that is, without the aid of the cystoscope and ureteral catheter—have complicated the diagnosis. A roentgen shadow in or near the urinary tract cannot always be interpreted as a ureteral or renal stone. Many times shadows supposed to be stones will not be found at operation, and, conversely, many shadows thought to be far away from the urinary tract are later found to be urinary calculi. The roentgenogram, when properly interpreted by means of the cystoscope and shadow catheter and pyeloureterogram, will demonstrate ureteral stone, if present, in about 94 per cent of instances. I must condemn the practice of operating for shadows found in the roentgenogram even when a good history is obtained unless the shadows have been checked by the ureteral catheter.

Shadows occurring near the lower ureter are more frequently misinterpreted than those found in the middle or upper ureter. Irregular shadows are more often stones than round ones although this cannot be used as a diagnostic aid. Shadows that may be confused with renal or ureteral shadows are the following: appendiceal stones, calcified thickened tip of appendix, phleboliths, fecoliths, buried sutures covered with lime salts, obliterating emboli, calcified tag of omentum, gall stone, pieces of bone, bullets, or shot, Murphy button, bismuth in the intestine, Pott's disease, abscesses with calcification, ossification of costal cartilages. All of these may cast a shadow similar to that found with stone.

Stereoscopic roentgenograms are of some value when the ureter contains a shadow-casting catheter so that the plane of the ureter may be distinguished from that of the suspected shadow. Shifting the tube so that stereoscopic views of suspected shadows are obtained on the same plate has been used by Kretschmer to differentiate extra-ureteral from ureteral shadows. If the shadow of the catheter and the suspected stone are adjacent in both views, the shadow is said to be a stone. If, however, in the second view—that is, after the tube has been shifted—the shadow of the catheter is far away from that of the suspected shadow, a ureteral stone is not present.

The Buckey diaphragm has assisted in revealing shadows which might not be seen with the ordinary roentgen technique. Shadows that are projected on the spine or on the pelvic bones may be overlooked. In some instances, the tube can be turned at an angle so that suspected shadows in this locality can be projected on the film where they do not overlie the pelvic bones.

If patients do not routinely carry out the instructions given them concerning preparation for a roentgenogram, gas shadows, etc., may cover up a small stone shadow.

Stones of a low calcium content will not cast as distinct a shadow as those having an abundance of calcium.

Cystoscopic findings.—The bladder is usually irritable, the examination being very troublesome to the patient in spite of careful local anesthesia. The meatus of the ureter containing the stone is overactive and small spurts of urine are frequently ex-

uded. The urine may be cloudy or hemorrhagic. The meatus may be red, the lips edematous—this latter depending somewhat upon the amount of infection present. When the stone is in the bladder section of the ureter, the meatus may be prominent and may protrude as a small tumor. Its opening may be hard to find. The urine oozes out without force and there may be no ureteral contraction. Sometimes the calculus can be seen protruding from the meatus.

Catheterization.—The ureteral catheter usually meets obstruction which may be absolute or only a slight difficulty. This depends upon the amount of spasm, the acuteness of symptoms, the anesthetic used, the contour of the stone but not its size. A small ragged stone can produce complete obstruction while a large round one may be passed easily. A patient in severe pain during an acute attack will not relax, so that obstruction is usually complete. The same patient after a large dose of morphine or a general anesthetic may relax and the obstruction may be slight or absent. When a patient is completely relaxed during anesthesia and ureteral catheterization is attempted, stones are frequently pushed from the lower ureter into the pelvis of the kidney. This occurs most often when a patient has had a stone lodged in the ureter for some time so that the ureter above the stone is thoroughly dilated.

When passing a stone obstruction with a ureteral catheter, one may feel grating or holding. When the eye of the catheter passes above the obstruction, a sudden constant flow of urine which may contain pus or blood usually is found. This is a positive finding indicating intra-ureteral obstruction. In some instances, mucus which has collected above the stone may temporarily obstruct the eye and lumen of the catheter so that no urine can be obtained until the mucus is removed. If in doubt concerning the cause of ureteral obstruction, a wax catheter may be used. If a calculus is present and the wax catheter can be passed up to or beyond the stone, a scratch mark will be made on the wax. This is of great diagnostic importance. When a catheter has has been passed beyond a suspected obstruction and there has been some difficulty in the passage, the catheter should not be removed until the diagnosis has been completed. If the catheter is removed, the irritation from this manipulation may cause swelling or a change in the axis of the stone so that obstruction may then become complete, which prevents the introduction of a second catheter. If no urine is obtained, the ureteral catheter should be thoroughly irrigated to be sure of its patency.

Pyelography.—A uretero-pyelogram will demonstrate dilatation if present above the stone obstruction. When a uretero-pyelogram is made, the eye of the catheter should just pass the suspected obstruction so that when the shadow-casting medium is injected, the ureter will be filled first and the pelvis second; that is, will be filled from the bottom up. When ureteral stone is present, a shadow catheter passes over or adjacent to the suspected shadow in all roentgenograms no matter at what angle they may be taken. If the stone has been a long time in its passage through the ureter and complete ureteral obstruction has been present, the pelvis of the kidney may be dilated.

Differential Functional Tests.—The differential functional estimate of kidneys as obtained by means of the dye tests may be misleading. The separate functional estimate does not always indicate the functional capacity of the kidney that is suspected of damage because of a ureteral stone.

Recently I examined two patients with ureteral stone that illustrate this observation. A man had complained of ureteral colic for six days, the last two or three days constantly. Obstruction was found just outside the bladder section of the left ureter. The obstruction was passed with some difficulty. The catheter was allowed to remain in place and a differential function test was done. The right side appeared in normal time. The left side produced no dye after twenty minutes observation. A pyelo-ureterogram was made which demonstrated a normal kidney pelvis but slight dilatation of the ureter. The ureteral catheter was irrigated every two hours to prevent plugging. There was a quantity of highly colored urine which drained through the catheter. Twenty-four hours after the first test was made, the dye returned in normal time and the concentration was good in five minutes.

Another patient passed ureteral calculi from his left kidney eighteen years ago. He had pain in the left loin for the last two months in short attacks. December 26, 1921, the pain was very severe and lasted until December 29th. After three attempts, the stone obstruction was passed with a small ureteral catheter. A differential functional test was made and no dye was obtained after thirty minutes from the affected side. The next day the dye returned slightly in eight minutes and became concentrated after ten minutes. Two days later

the dye returned in normal time and the concentration was normal.

The differential diagnosis of ureteral stone is not easy. The following are a few of the conditions from which ureteral stone must be differentiated: appendicitis, gall bladder disease, stones or infection, diseases of the ovary, pelvic infection, duodenal ulcer and perforation, gastric ulcer and perforation, intestinal obstruction, pneumonia with abdominal pain, other ureteral or kidney lesions, pelvic tumors, any abdominal lesion with a shadow in the roentgenogram.

TREATMENT

I find definite indications for treatment in each individual case depending upon the location, size and number of stones, together with the general condition of the patient, the combined kidney function and extra-urinary complications. The treatment of ureteral stone may be divided into non-operative, operative and after-treatment.

Non-operative treatment consists of: (1) manipulation and dilatation of the ureter with ureteral catheters or bougies so that a stone may be assisted in its quick passage through the ureter, and (2) of bimanual manipulation so that a stone may be forced by palpation into the bladder.

About 90 per cent of calculi found at any location in the ureter will pass spontaneously or can be removed by cystoscopic manipulation. Twenty per cent of patients with ureteral stones give histories of previous attacks when stones passed spontaneously. I have watched ureteral stones for months which passed eventually without operation.

Non-operative treatment should begin as soon as a diagnosis is made. A ureteral catheter that has passed a stone obstruction should be allowed to remain in the ureter for several days. This permanent catheter will relieve pain at once because it drains the ureter and kidney pelvis, thus preventing backing up of urine with consequent infection. A permanent catheter will dilate the ureter and will serve as a guide to the passage of additional catheters. These are used as wedges to produce dilatation so that the calibre of the ureter will permit the easy passage of the stone. After as much dilatation as possible is obtained, a few cubic centimeters of sterile oil or glycerine may be injected at the site of obstruction. The ureter above and the pelvis of the kidney are then filled with salt solution or sterile water. This produces pressure which is supposed to hasten the progress of the stone after the catheter is removed. Silver nitrate, 0.5 per cent, may be injected into the ureter and kidney pelvis to control infection.

When a catheter cannot pass a stone obstruction a small amount of cocain or novocain solution injected into the ureter at the position of the stone may cause the ureter to relax so that a catheter may be passed.

Frequent roentgenograms should be taken to determine the progress of the stone. If progress is not made, frequent catheterizations may be done together with dilatation as just described. When a calculus is caught at the ureterocystic juncture or is in the bladder section of the ureter, instruments that have a catching shoulder may be used. With these a stone may be pulled through the ureter and into the bladder. I use for this purpose steel olives ranging in size from 8 to 20 French. The tips are screwed on to a flexible bougie which is about the size of a No. 6 ureteral catheter.

It is necessary to take roentgenograms after every manipulation with the ureteral catheter since frequently a stone passes without pain after dilatation of the ureter. Do not fail to take roentgenograms and be sure to pass a ureteral catheter after a stone has passed, as you may have but part of the stone and multiple stones may be present.

Fulguration of the uretero-vesicle valve may assist a stone in its passage through the lower ureter.

Operative treatment is indicated (1) when the ureteral stone is large (usually more than 2 cm.) and when it does not progress through the ureter; (2) when the kidney is being destroyed; (3) when reflex anuria occurs; (4) when other diseases contraindicate long attacks of pain; and (5) when the patient cannot withstand without severe reaction the cystoscopic manipulation. In some instances, the economic situation of the patient may demand immediate operation. The size of the stone does not in itself constitute an indication for operation. One should never be in a hurry to operate unless a complication arises.

For stones in the uretero-pelvic juncture and upper third of the ureter, the usual Mayo lumbar incision is used. The lower end of such an incision may be extended as far forward as necessary. This incision will expose the middle third of the ureter as well as the upper third. An extra-peritoneal operation should always be done. For stones caught in the lower third, I like an incision parallel

with Poupart's ligament. Many times one can remove stones from the lower ureter through the usual suprapubic cystotomy incision. One should be able to explore the bladder when necessary without making an additional incision.

Most operations on the lower ureter are done with general or spinal anesthesia with the patient in the Trendelenburg position and turned to the opposite side. Stones may fall back through the ureter and into the kidney pelvis. Sometimes the manipulation of searching for the ureter is sufficient to push a ureteral stone into the bladder.

Suture of the ureter following a ureterotomy is not always necessary; a few interrupted stitches of fine plain gut are sufficient. As a rule the ureter will not leak. If leakage occurs, the ureter may drain for ten to twelve days; fourteen days usually finds the wound clean and dry.

Upper ureteral stones may be pushed into the pelvis of the kidney and a pelvio-lithotomy done. Lower ureteral stones may be squeezed into the bladder or into the bladder section of the ureter, from where they may be removed by splitting the ureteral meatus. After such an operation, the bladder may be closed without suprapubic drainage.

When a ureter has been opened and a stone removed, a large ureteral catheter should be ready for use so that the ureter may be explored from the bladder to the kidney pelvis. Many times fragments of stones may be left after operation or two or more stones may be present when only one shadow was found in the roentgenogram.

After-treatment.—Infection is one of the leading etiological factors in the production of renal stone. Every patient with urinary lithiasis should have all suspicious foci of infection removed and after operation should submit to regular pelvic lavage until the catheterized urines are free from pus and cultures are negative. During convalescence all patients should be re-examined with the roentgen ray for evidence of recurrence and for bits of stones that may have been overlooked. Pelvic lavage should be repeated if stones recur. If a patient comes from a locality that is notorious for its number of urinary stones, all drinking water should be boiled.

CONCLUSIONS

1. Infection is one of the factors in the production of renal and ureteral stone.

2. The diagnosis may not be easy and depends upon the following positive findings: pain, vesicle irritability, urinalysis, roentgen ray, pyeloureterogram, obstruction to the ureteral catheter, and bimanual palpation.

3. Ureteral stone must be thought of when considering any abdominal pain.

4. Eighty per cent of ureteral stones are found in the lower third of the ureter.

5. Differential functional tests do not indicate the true function capacity of a kidney which has been temporarily damaged because of ureteral stone.

6. A patient may pass a ureteral stone that is too small to cast a shadow.

7. A ureteral stone may be silent in its passage through the ureter.

8. A calculus may remain in the ureter for months without producing pain or permanent damage to the kidney.

9. Ureteral stone must be differentiated from the following which are the common conditions found: appendicitis, gall bladder disease (stones or infection), diseases of the ovary, pelvic infection, duodenal ulcer and perforation, gastric ulcer and perforation, intestinal obstruction, pneumonia with abdominal pain, other ureteral or kidney lesions, pelvic tumors, any abdominal lesion with a shadow in the roentgenogram.

10. Ninety to 95 per cent of ureteral stones pass spontaneously or can be removed by manipulation.

11. A permanent ureteral catheter produces dilatation, relieves pain and facilitates the easy and quick passage of a ureteral stone.

12. Not more than 10 per cent of ureteral stones require operation.

13. Do not operate for shadows. Be sure the patient has a stone before you operate.

14. The position of the calculus indicates the type of surgical operation to be done.

15. Indications for operation are distinct. The element of time is not important.

16. After-treatment which includes removal of all foci of infection, lavage of the kidneys, pelvis, etc., is important and should be carefully and thoroughly carried out.

DR. WILLIAM F. BRAASCH, Rochester: Failure to recognize the presence of stones in the bladder by the usual clinical methods occurs surprisingly often. Such errors in diagnosis are due to the facts that in many cases there are

few if any symptoms which may be regarded as typical of stone, that analysis of the urine is often negative, and that the roentgen-ray examination is negative in approximately 20 per cent of cases. It is evident, therefore, that no matter how obscure the symptoms may be, and even though the urinalysis is negative, a roentgenogram should be made; and when the history is suggestive of stone it should not be taken for granted that stone is not present because the roentgen ray is negative. In a great many cases, the diagnosis will depend on the cystoscopic examination.

The subject of stone in the ureter has been ably covered by Dr. Thomas. I should like to call attention, however, to the cases in which the diagnosis is not made because the roentgen ray is negative. The presence of ureteral stone may be overlooked in the roentgenogram because it is obscured by the shadow of the bony pelvis, because it is confused with shadows of extraureteral bodies such as phleboliths, or because its structure is such that it fails to cast a shadow. The diagnosis in such cases can be made only with the aid of the ureteral catheter or the ureterogram.

I have repeatedly observed cases of small stones in the ureter in which there was a definite history of renal colic, and the roentgen-ray and cystoscopic examinations were negative. A diagnosis of stone could, of course, not be made. Nevertheless, the patients were informed that if stones were present they would probably pass. Many of these patients have passed stones in from ten to fifteen days after going home. In such cases we get credit for making the correct diagnosis and for curing the patient.

With regard to the removal of ureteral stone by manipulation: the tendency in the last two years unquestionably is to remove the stones by manipulation whenever possible. This method is not, however, without danger. I have seen very severe infections of the kidney, necessitating the removal of the kidney, as a result of manipulation of these stones in the lower ureter. Furthermore, I have seen a number of cases in which the stone was impacted so that it required repeated attempts to remove it, and as a result there was considerable damage to the kidney. There are definite contraindications to the removal of stones from the ureter by manipulation, and not the least of these is the intolerance of the patient. Not infrequently patients would rather have an operation than repeated cystoscopic manipulations, even with sacral or general anesthesia. Although it is a method that offers brilliant results in many cases, nevertheless it cannot be employed in all.

Dr. F. E. B. Foley, St. Paul: Dr. Thomas has presented his subject in a very comprehensive and instructive way. Certainly the condition of ureteral stone is one in which the devices of the trained urologist are most needed.

The point Dr. Thomas makes of not operating for shadows is, I think, very important. Even if you have a typical history and the *x*-ray shows a shadow in the region of the lower part of the ureter, that in itself is no indication for operation. The shadow must be positively identified as a ureteral stone before any operative procedure is undertaken.

A point that occurs to me in connection with surgical procedures in these cases is the healing of the ureter after the removal of the stone. An uninfected normal ureter, if carefully sutured, heals promptly. An infected ureter in which an impacted stone has lain for a long time is greatly thickened and indurated, making accurate suture impossible. Exposing the ureter and separating it from the surrounding tissues, interferes with its blood supply. These things, together with the constant seepage of urine into the tract, prevent healing and favor the formation of a ureteral fistula. I have had one such experience recently. In such cases I now push a ureteral catheter well up into the ureter and the distal end into the lower segment and into the bladder, bringing it out through the urethra. This catheter in place for a number of days keeps the wound dry and permits the surrounding tissues to heal in about the ureter independently of any process of repair that is going on in the wall of the ureter itself. I would like to hear from Dr. Thomas concerning this procedure.

Another point which Dr. Thomas did not mention particularly is that of ureteral stone as a possible cause of obscure abdominal pain. We have had four or five cases at the Miller Hospital Clinic recently which had no typical history of stone and which had been through other departments without a diagnosis being made. On careful urologic investigation they proved to have ureteral stones.

Dr. J. L. Crenshaw, Rochester: Dr. Thomas has called attention to the fact that in many cases of stone in the ureter the ureteral catheter will not pass the stone until a solution of cocain has been injected into the ureter. In such cases a number of points should be observed. First, if the urethra or ureter has been traumatized, the absorption of the cocain is much more rapid than if there has been no abrasion, and the danger of toxic effects is correspondingly increased. I prefer to inject novocain rather than cocain. A second point is that with caudal anesthesia more relaxation of the lower ureter is obtained than by the local injection of cocain or novocain, and the cystoscopic examination is also much more easily accomplished.

In conclusion, I wish to call attention to the following points: (1) the mortality from litholapaxy is far lower than from cystostomy; (2) the difference in mortality more than compensates for the moderate increase in the recurrence of stone after litholapaxy, and (3) the use of caudal anesthesia and permanent urethral drainage renders lithotrity available to a large number of patients who would otherwise be subjected to the greater risk of cystostomy.

Dr. Gilbert J. Thomas, Minneapolis (closing): I wish to thank Dr. Crenshaw for mentioning the danger of using cocain in the ureter or urethra. Novocain is much safer. A fistula resulting after the removal of a stone in the lower part of the ureter has not occurred very often in my experience. In one instance a stricture was present just outside of the bladder so that it was necessary to pass bougies into the bladder to dilate the stricture, the ureter having been opened above this point. To prevent fistula caused by the possible contraction of the stricture, a Garceau catheter, No. 10 French, was passed into the bladder and the small end was pushed through the ureter to the kidney pelvis. This catheter acted as a drainage tube and as a splint so that stitching of the ureter could be more thoroughly done. The drainage after all operations on the ureter should not contain gauze but gutta percha. In no instance, except where the kidney was totally destroyed or in which some obstruction remained in the ureter have I seen a fistula that lasted more than about two weeks.

THE TRAINING OF THE LABORATORY TECHNICIAN*

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The practitioner when called upon to secure laboratory aid in the diagnosis of obscure conditions is dependent to a very large extent on the character of the work of the technician. Evidence of the importance of the problem of obtaining good technical workers is found in the ever increasing demand for those who are properly trained and upon whose results dependence can be placed. Up to the present time technicians have been trained in different ways. Among the number are included those possessing various qualifications and experience as laboratory workers. The demand has been such that it has been necessary to draw upon all available help. Good laboratory technicians are desired by physicians and surgeons in private practice, by groups of physicians, by large clinics, hospital laboratories, clinical laboratories, state and city boards of health and elsewhere. Such an impetus has been given to the necessity for clinical laboratory work in connection with all medical institutions that an alarming shortage of properly trained technicians has resulted.

Those who are now engaged as technicians in laboratories have picked up training in various ways. Many have had the advantage of a part or all of a college or university course and have gained training in different laboratory procedures through actual experience under the direction of competent pathologists and bacteriologists. Some of the most proficient may have had little or no preliminary education but are naturally adapted to the detailed and painstaking procedures in the clinical diagnostic laboratory. The majority of laboratory technicians at the present time are women, although the demand is increasing to such an extent that men are becoming attracted to this line of work.

Grant and Wilson relate some of their experience in employing laboratory technicians. They state it has been their experience within a year to have employed at least thirty technicians, all of whom have had various opportunities for experience and training. Some had Bachelor degrees; some had M.D. degrees. The authors state that "unfortunately not two per cent of this number could properly take care of the work they claimed to be efficient in. The following question has been asked of fifty applicants who have applied to us for positions, claiming good working knowledge of bacteriology, and in no case has it been properly answered: 'How do you differentiate streptococcus from pneumococcus?' The answers were numerous and varied but none were answered correctly. A few were able to do a little blood chemistry, but none seemed to understand the underlying principles of chemical analyses. It is only the occasional one that is able to correctly make up a normal solution."

In order that there may be no misunderstanding regarding the points which this paper attempts to emphasize, it should be stated with distinct clearness that the field of activity of the laboratory technician is not that of the clinical pathologist and bacteriologist. The questions regarding the requirements of the clinical laboratories, the training of those in charge and the methods followed in the interpretation of laboratory findings, all of which are occupying space in our current medical literature, should be kept clearly separate in point of view from the discussion of the training of the laboratory technician as it is found in this paper.

Kolmer, Moore and others have discussed the question of general standard requirements for clinical laboratories in an able manner. Tentative conclusions which these authors have reached have to do with the clinical laboratories themselves but to a certain degree they are of direct concern to us, as we consider ways and means for the training of the laboratory technician. Moore has secured the opinions of men whose work and experience entitle them to assist in defining the standards which should be maintained by clinical laboratories. These, modified to some extent by the author, are summed up as follows:

"1. The director of a clinical laboratory should be able to act as consultant in the various laboratory reports and in correlating them and other clinical data. The laboratory director, therefore, should be a medical graduate.

2. Many technical methods—most of them perhaps—may be satisfactorily carried out by techni-

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cians. The data arrived at from such methods, however, should be interpreted by specialists.

3. Technical procedures (methods) used in an acceptable laboratory should be the best available, those used and approved by authorities. If it is insisted that only the best modern methods be used in a laboratory, it follows that the technicians employed must be trained in these methods.

4. The equipment of an acceptable laboratory should be such that the proper technical procedures may be carried out. There should be ready access to current scientific books and journals. Clinical data and other pertinent information should accompany the submissions of specimens or other material to the laboratory."

The above requirements are clearly defined and can be carried out by any private or hospital laboratory or other institution, except in one respect, namely the acquisition of properly trained technicians to the staff of the laboratory. The problems, therefore, of training laboratorians as they should be trained and the agreement upon standard methods of procedure have not been solved. These problems are not directly concerned with laboratory directors alone but are of the utmost importance to practicing physicians and surgeons. It cannot be denied that some means must be provided so that those who desire to enter clinical laboratory work as assistants must have mapped out for them some practical, thorough courses of study.

There are many serious-minded individuals who have desired to become proficient laboratory technicians but have had no idea as to how to proceed. Those who have been fortunate enough to secure university training and who are capable and dependable have been able through private study and good tutelage to acquire the necessary knowledge and technique. Various universities and departments of bacteriology have encouraged students to take up the laboratorian profession as objective and many have been trained in this way. Unfortunately, however, unless such training can be given in connection with the medical department of the university, it is inadequate and the student is left at the end of the college course to shift for himself and pick up the necessary training wherever the opportunity may be found. Until such time as pathologists and bacteriologists, including their technical helpers, are paid salaries commensurate with the time, labor and study involved and the class of service rendered, few students will be able to take a university course leading to laboratory technician as objective. Many of these who can complete such a course would fall within the class of workers mentioned in quotation above from Grant and Wilson. It appears clear, therefore, that to fill present needs those who desire to become laboratory technicians should be able to avail themselves of specially prepared courses.

The good laboratory technician must be extremely patient, an indefatigable worker, one who possesses common sense and judgment which is not subject to prejudice. It should be most emphatically stated that the laboratorian should be one whose moral character is irreproachable. He should be one concerning whom there is never the slightest suspicion of untrustworthiness or dishonesty in word or deed. The next requirement involves previous training. The more education one has the better, but at the present stage of our development in this line of work, college training while desirable is not at all necessary. A similar statement regarding high school education cannot be made with equal emphasis. However, high school training is certainly not a necessary requirement. Education, travel, development of character and personality are of great value to any worker. However, for the specific work involved, at the present time, it is not necessary that the efficient laboratory technician should furnish prerequisites. Most laboratory directors agree in preferring technicians of common sense and dependable character regardless of previous educational advantages or other accomplishments.

Heretofore, the best training which has been provided for laboratory technicians is that given through individual instruction in various clinical laboratories. This method of training, however, is not sufficient to meet present-day needs for laboratory technicians. Neither does it afford some of the advantages pertaining to class work and didactic teaching. Apprenticeship does not compare in thoroughness or in satisfactory results with a regular, scheduled, well balanced course of instruction, including lectures, recitations, quizzes and laboratory practice periods. In following the latter method, of course, it is necessary that competent instructors be provided and that subjects included in such a course should be handled by those who are specialists.

Such a course should be so mapped out that proper attention is devoted to fundamental principles involved in the different subjects taught. Sufficient theory should be presented to give the student the groundwork upon which to base future development in study and in technique. Such work for the student can be provided only in connection with a regular course in which class room and laboratory practice periods are carried out according to regular schedule. Individual instruction cannot be given in this way except at the expense of so much time that it is prohibitive.

For the proper training of the successful laboratory technician, there cannot be an over-emphasis of the clinical significance of laboratory findings. Some may contend, unjudiciously, that it is the laboratorian's business to perform the tests, that it is entirely unnecessary, probably undesirable, for the technician to know anything about the relation of the results to the physician and to the patient. Only the undesirable technician will be content with such limitations. The student technician early in the course should be held and fascinated by the interesting results attending various tests and their meaning. There are many good reasons for this, which obviously appear on the surface. In any line of work there is opportunity for use of the head as well as the muscles. Certainly in conducting laboratory technique, it is desired that the procedures should be carried out by an intelligent, interested, sympathetic technician rather than by a mere machine. When the technician understands the clinical significance of many findings the work is transformed from mere mechanical drudgery to a vocation which is fascinating, interesting and above all a service to mankind. Moreover, unless the technician is taught along this line, he will fail to grasp the point of view of the physician.

The properly trained laboratorian should thoroughly understand the principles of medical ethics. He should be brought to an understanding of the doctor's problems for the good and sufficient reason that he is employed as a faithful helper and coworker of the physician.

It is scarcely necessary to dwell in detail upon the various subjects which should be included in a course such as is suggested.

The student technician should receive thorough instruction and practice in routine clinical bacteriology, elementary chemistry, urinalysis, blood examination, gastric analysis, blood chemistry and serology. From experience, it seems best to build such a course around a comprehensive fundamental course in bacteriology as the framework. The instruction in chemistry should include the fundamental principles of simple inorganic chemistry. In the laboratory practice in chemistry there should be incorporated the preparation of normal solutions, use of burette and pipettes, titrations, simple chemical tests, explaining the reactions noted in urinalysis, and such other procedures as are of fundamental importance in conducting clinical laboratory tests. The course in bacteriology should consist not only of the study of the common pathogenic organisms but should include such subjects as germicidal assay, bacteriologic study of milk and water, disinfection of the hands, animal inoculation, and the class work should include such principles of bacteriology as are found in the medical college course. With such a course in bacteriology as the groundwork it is not difficult to build up the other subjects around it in such a way that considerable theory is included in the course, thereby affording a basis for further independent study, and some degree of training in methods which can be followed later in an endeavor to acquire better knowledge. Experience has justified the assumption that it is well to include in the curriculum of such a course practical text-book and lecture work in the fundamentals of general anatomy and physiology, materia medica, including only the fundamental principles and the characteristics of some of the few of the most common drugs, and medical terminology, for the purpose of acquainting the student with the most important words and phrases in every-day medical vocabulary. There should also be included some instruction in parasitology. The student should be brought into contact with current medical and scientific literature and taught to note, abstract and fill useful references. Autopsies conducted by an experienced pathologist and teacher afford invaluable aid to the student. Finally, much stimulation can be given by incorporating in such a course one or two lectures each by specialists along various lines of medicine, surgery and pathology. Practical pointers on the handling of nervous and mental cases, children, proper methods of taking case histories, special methods of laboratory examinations in eye, ear and nose, practice in in-

ternal medicine and in surgical practice should be discussed before such students by men who are specialists along these lines. For general information practical roentgen-ray work should be demonstrated.

The problem of instruction in roentgen-ray work is becoming more and more acute. Many of the smaller hospital laboratories desire the services of technicians who are able to handle all of the routine clinical laboratory work and who have had experience in caring for roentgen-ray laboratory work. At present practically the only way open for the technician to acquire roentgen-ray training is to pick up the necessary technique and information while acting as assistant to those in charge of the roentgen-ray laboratory. It seems that, as conditions are at present, institutions should not expect proficient clinical laboratory technicians to possess more than ordinary information concerning roentgen-ray technique. Preparation of the patient, developing of plates, filing of plates and care of the roentgen-ray laboratory can quickly be acquired by an apt individual who is a successful clinical laboratory technician.

One other phase of clinical laboratory work should also be mentioned, namely basal metabolism. At the present time satisfactory results from basal metabolism tests cannot be expected unless this work is conducted by those specially trained. Those who have had experience will, we believe, agree that for the proper execution of basal metabolism, a university graduate is required. It is a recognized fact that those laboratories which are doing basal metabolisms successfully are depending upon the services of those who are specially trained in physics and chemistry, who have had special training in basal metabolism and who devote their entire attention to this work. It is assumed, therefore, that at the present time instruction in basal metabolism is not required by the clinical laboratory technician.

Having disposed of these several points, the question now arises as to how much time is necessary to impart to the student the general course of instruction as suggested above. Experience has shown that six months' time, while it may not be abundantly sufficient, represents the minimum period required to give such a course to the average student who is normal physically and mentally. A student who desires to take up this work, who is willing to put heart and soul into it regardless of sex, age within certain limitations, and previous education, can in six months' time master the principle and technique of routine clinical laboratory work. At the completion of such a course the student is then ready for apprenticeship practice. If his circumstances will permit, he can enter a well-selected laboratory as a volunteer worker and, depending upon the native ability of the individual, after a few months he should be able to take a position as chief technician in the average chemical laboratory. Most students who are not so fortunately situated can secure positions as assistant technicians and by applying themselves are able to work up toward positions more desirable.

An outline of such a course as described above occupying a period of six months may be arranged as follows:

GENERAL LECTURES

1.	General Bacteriology	24 hours
2.	Immunology and Serology	12 hours
3.	Serum and Vaccine Therapy	12 hours
4.	Chemistry, general and physical	24 hours
5.	Gastric analysis	7 hours
6.	Blood chemistry	10 hours
7.	Materia Medica	12 hours
8.	Urinalysis	20 hours
9.	Anatomy and Physiology	30 hours
10.	Medical Terminology	30 hours
11.	Interpretation of Laboratory Results	5 hours
12.	Hematology	20 hours
13.	Parasitology	6 hours
14.	Office Practice and Roentgen Ray	5 hours
15.	Autopsies	5 hours
		227 hours

SPECIAL LECTURES

1.	Nervous and Mental Diseases	2 hours
2.	Children	2 hours
3.	Surgery	2 hours
4.	Internal Medicine	2 hours
5.	Nose and Throat	2 hours
6.	Communicable Diseases	1 hour
7.	Genito Urinary	2 hours
8.	Hospital Practice	2 hours
9.	General Medicine	2 hours
10.	Life Insurance Urinalysis	1 hour
		18 hours

LABORATORY PERIODS

1.	Bacteriology	100 hours	25 periods
2.	Chemistry, Materia Medica, Blood Chemistry & Gastric Analysis	80 hours	20 periods
3.	Hematology (Complete Blood Examination) .	80 hours	20 periods
4.	Urinalysis	80 hours	20 periods
5.	Laboratory Diagnosis (Clinical Material) .	60 hours	15 periods
6.	Serology (Wassermanns, agglutination and complement fixation, blood grouping, etc.)	68 hours	17 periods
7.	Tissue Technique	12 hours	3 periods
		480 hours	120 periods

Considerable confusion exists regarding the question of standardizing clinical laboratories, licensure of technicians by federal or state authority and the standardization of methods of procedure. Gradwohl recommends "the recognition of the technician by some kind of board with authority to pass upon qualifications and give a certificate of merit to those who deserve it." The competent technician who is serious and whose work is of high order should be protected by receiving some stamp of approval or some authoritative recognition. Laboratory technicians are as deserving of such recognition as the trained nurse. How can laboratory technicians be recognized, however, unless some standard methods are provided as a basis upon which to grant official certificates to such workers. Some of the life insurance companies have standard methods which are relied upon by their association of medical examiners. On the other hand there is diversity of opinion among those experts on such questions as the best tests whereby albumin in urine is to be detected, how many casts present in a given urinary sediment should eliminate the applicant and how to estimate the number of casts, the significance of pus cells in such a sediment and how many may be allowed. Interrogate different clinical laboratory directors regarding methods used in making cell counts in spinal fluid, and inquire as to the methods used in standardizing autogenous vaccines. These are only a few well known illustrations of technical methods concerning which there is not entire agreement. Therefore, without further discussion, it would seem that there is an urgent need, in such procedures as are possible, for the establishment of some standard laboratory methods. Of course, this cannot be done within a limited time but some of our existing organizations could lend great aid to this work. Such work is needed not only for the benefit of the medical profession but for those who are conducting clinical laboratory work, and for the laboratory technicians themselves. After certain steps have been taken and certain standards of laboratory technique and methods have been accepted then can the efficient laboratory technician be recognized by proper license.

SUMMARY

1. The rapidly growing demand for laboratory technicians requires an analysis of the present day qualifications of the general technician.

2. The suggested standardization of the clinical laboratory and the requirements for such render it necessary that constructive thought should be given to the proper training of laboratorians.

3. A sufficient number of proficient technicians cannot be trained through idividual instruction. Moreover, individual instruction and laboratory practice as volunteer workers should follow a prescribed course of class work and laboratory training.

4. Under present conditions rigid insistence upon the maintenance of definite prerequisites for those desiring to become laboratory technicians, would be ill-advised.

5. Student technicians should receive a defined, carefully planned course in theory. A certain portion of time should be devoted to text-book assignments, quizzes, lectures and demonstrations.

6. The course should include proper allowance of time for the interpretation of laboratory findings, the elements of medical ethics and the suggestions of specialists who place dependence upon different phases of clinical laboratory work. In other words, every effort should be made to develop the student into a sympathetic, earnest, serviceable technician.

7. At the present time the minimum period for such a course, including theory and didactic teaching is six months. A definite course of studies for such a six months' course is submitted.

8. Clinical laboratory technicians should re-

ceive proper recognition in the form of an official certificate or license from state boards of health or other authorities. Moreover, technicians should be graded according to ability, training and experience. Licenses should be issued to those who merit recognition as chief technicians or first assistants to the directors of laboratories, and to assistant technicians. A certain period of successful work as assistant technician, regardless of previous educational advantages, should entitle one to apply for license as chief technician.

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THE VALUE AND IMPORTANCE OF BLOOD CHEMISTRY IN CLINICAL MEDICINE*

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Chemical analysis of the blood is rapidly becoming a laboratory procedure of considerable importance, although it has but recently entered the field of practical usefulness. However, its utility as a diagnostic, prognostic and therapeutic aid is made use of by too few physicians, owing, no doubt, to the fact that to many the phrase "blood chemistry" connotes elaborate procedures carried on in physiological-chemical laboratories of universities or other research institutions. As a matter of fact, the technic of chemical blood analysis has been greatly simplified by such men as Folin, Benedict, Bang, Lewis, MacLean and others, and many tests have become available to practically all physicians who wish to practice scientific medicine. Moreover, simple methods for the preservation of the blood have been devised which make it possible for those who have not the facilities for performing the tests themselves to send blood to the proper laboratories for analysis.

Information which is not obtainable from urinalysis or other tests is often furnished by blood chemistry. The urine may contain abnormal elements such as albumin, casts, red blood cells, et cetera, or abnormal amounts of normal elements such as urea, chlorides, et cetera, which findings only show what the kidneys are excreting, but what the kidneys are unable to excrete is often of greater importance, and this is best ascertained by chemical analysis of the blood.

The number of elements that can be tested for and are being tested for in the blood is very large, but the technic of many of them is thus far too cumbersome to serve any function to the practising physician. Those elements that may be tested for quantitatively by relatively simple processes are urea nitrogen, sugar, creatinine, uric acid and the alkali reserve or carbon dioxide combining power of the plasma. The total non-protein nitrogen is also often determined, but its estimation as a rule furnishes very little extra data over that obtained from the estimation of urea nitrogen alone. In a few exceptional cases the cholesterol and chloride content and the diastatic activity are obtained. In what follows, only such chemical changes of the blood will be discussed as have been proven of undisputed clinical importance.

Chart I shows the important blood changes in diabetes, nephritis and gout, which diseases I shall consider for differential diagnosis. As is well known, the variations in the quantities of the above substances pass gradually from the normal to the pathological so that in many instances the blood chemistry findings, though interesting, are inconstant and require very careful study and interpretation. For this reason I am not discussing a number of border-line conditions such as eclampsia, hypertrophied prostate with obstruction, cancer, et cetera, but only, as stated above, such findings as are of undisputed clinical importance.

*Presented before the annual meeting of the Minnesota State Medical Association, Minneapolis, October, 1922.

CHART I.*

	Normal Average	High Normal	Diabetes	Nephritis	Gout
Urea Nitrogen	10-15	20	.....	20-300	....
Sugar %	.08-.12	0.15	.15-1.2	.08-.26	....
Creatinine	1-2.5	3	.....	3-30	....
Non-Protein Nitrogen	20-30	40	.....	40-350	....
Uric Acid	1-3	3.5	.....	4-25	4-10
CO_2 Combining Power %	50-75	Low 45	50-10	50-15	....

Diabetes.—Glycosuria is practically always a pathological condition. Contrary to the findings of Benedict and others that sugar may be found normally in the urine in very minute quantities, Folin[1] and his co-workers have very recently been able to establish that the reducing body so often present in the normal urine is not glucose, but some other substance excreted by the kidneys, which is capable of reducing copper solutions. One instance where there is often misinterpretation as to the presence of glucose in the urine is when lactosuria obtains during the latter months of pregnancy and during lactation; the reducing substance mistaken for glucose is lactose.

But even the definite presence of glucose in the urine is not indicative of diabetes. The kidneys in their excretory function react differently to different substances. One class of substances, which includes sugar, requires a certain concentration in the blood before there is any overflow into the urine. The point of lowest concentration at which the overflow occurs is known as the renal threshold. The other class of substances, the class that includes urea and chlorides, for example, passes through the kidneys into the urine from any concentration in the blood. Such substances are said to have no renal threshold. The renal threshold varies for different substances. For sugar, the concentration in the blood generally must rise to .16 or .17 per cent before any sugar will filter through into the urine. If the sugar in the blood therefore is of any lesser concentration, no glycosuria will occur. It is very evident then that normally when the blood concentration of sugar is about .10 per cent there will be no glycosuria.

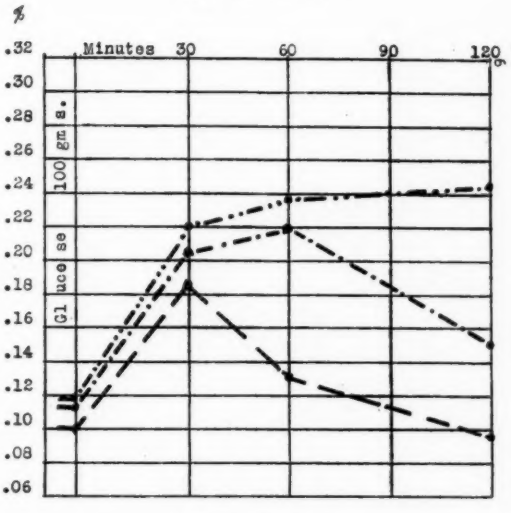
Not infrequently, however, there are certain cases which will present glycosuria when the blood sugar concentration is .10 per cent or even less. In these cases it is thought that the kidney has lost its safety valve function or its renal threshold for sugar, and that the sugar will then overflow into the urine under any concentration. When glycosuria occurs with a normal blood sugar, the condition is known as renal diabetes. From the therapeutic as well as the diagnostic standpoint, it is important to recognize such cases because they do very poorly under a regimen for diabetes mellitus. (The renal threshold can also be lowered experimentally by the injection of phloridzin.)

The differential diagnosis between the glycosuria of diabetes mellitus and the glycosuria of renal diabetes can seldom be made without the analysis of the blood sugar. A test that is commonly used for this purpose is the alimentary glucose tolerance test. There are several modifications of this test, and the most scientific one is that suggested by Beeler,[2] Fitz and others. However, the simpler test hae proven very satisfactory, that in which 100 grams of glucose dissolved in about 300 c.c. of water, to which the juice of one lemon has been added, is administered to the patient after about fourteen hours of fasting, and the blood sugar is estimated just before the administration of the sugar, and at one-half hour, one hour, and two hour intervals after the administration.

The normal blood sugar curve after such a test shows a maximal rise at the end of one-half hour after ingestion, a marked drop after one hour, and

CHART II.

Typical Curves



Normal curve
Mild diabetic curve
Severe diabetic curve

*The above figures represent the number of mgm. per 100 c.c. of blood, except in the case of sugar and CO_2, where they represent per cent.

the return to normal within two hours after ingestion. (Chart II.) In cases of diabetes mellitus there is a sharp rise which often continues up to the two hour period and sometimes even longer, and the return to normal may be delayed up to from four to eight hours after the ingestion of the glucose. In a case of renal diabetes the curve is entirely normal. In what may be termed the pre-diabetic state, both the rise and fall in the curve may be delayed, but not to such an extent as in a well-established case of diabetes.

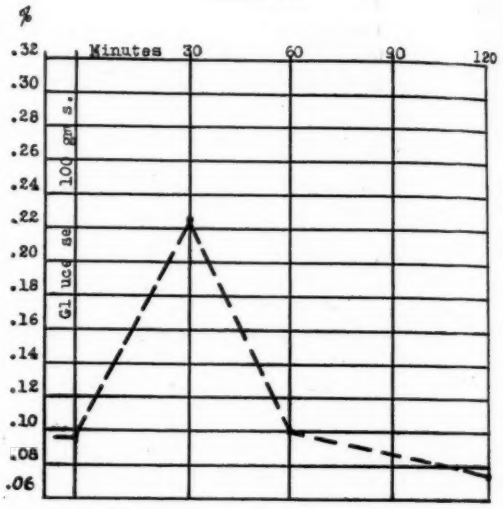
As has been mentioned above, failure to differentiate renal diabetes from true diabetes may result in improper management of the case, many instances of which are cited in the literature. A good example of this is the one reported by John[3] of a girl, aged 18 years, whose condition was diagnosed diabetes because of the presence of sugar in the urine. She was placed on the "Allen Treatment" with the result that in four months she dropped from a normal weight of 123 pounds down to 63 pounds. She became a mere skeleton. In spite of the treatment she continued to excrete sugar in the urine. A sugar tolerance test was then made which established the fact that the patient was not a diabetic at all, since she gave a perfectly normal curve. She was then placed on a high caloric diet containing a large amount of carbohydrates and she improved very rapidly. Her blood sugar at no time rose above the normal during the treatment.

I have had a number of similar cases where patients have shown sugar in the urine but have had absolutely no other evidence of diabetes mellitus. The glucose tolerance tests revealed entirely normal sugar curves. I will cite several cases for illustration.

Case 1.—Mrs. J. J. M., aged 35, married, complained of gastric distress with bloating and belching, some constipation, some shortness of breath, no excessive thirst, no nocturia, no urinary frequency. Patient drinks very little fluid of any kind. Physical examination showed a woman 5 feet, 2 inches in height, weighing 176 pounds. Temperature, pulse and blood pressure normal. She was about 45 pounds overweight. Her general examination gave very little of importance. The blood examination was negative. Repeated urine examinations showed sugar present on practically every occasion, from a small trace to a large amount. She was given a sugar tolerance test with a normal result as shown in Chart III.

The test suggested at once that this was not a case of diabetes mellitus. She was placed on a slightly restricted diet because of her obesity and was told that she would

CHART III.



have to be watched so as to be sure that the condition would not turn into true diabetes. Six months later she again reported, and was found to be in excellent health, presenting no new symptoms. A blood sugar at this time again gave an absolutely normal result. The urine again showed a rather large amount of sugar. This case is unquestionably one of renal diabetes.

Case 2.—Mr. R. S., aged 35, married, came complaining of pressure and fullness in the stomach with belching. He experienced a dull ache when his stomach was empty. A glass of milk or alkali relieved the condition. Physical examination showed a man 5 feet, 3.25 inches in height, weighing 146 pounds, pulse 84, blood pressure 130-78, no special findings. In eight urinary examinations sugar was present from a faint trace to a fairly large amount in all but one. Blood sugar tests on three different occasions during a period of 10 months gave from .09 to .109 per cent. The gastric analysis showed a definite hyperacidity. The patient was placed on a diet for hyperchlorhydria, on which his symptoms disappeared. He has gained in weight and during 10 months observation has shown no symptoms or signs of diabetes mellitus, though his urine still contains sugar.

Not only is blood chemistry necessary for differentiating renal diabetes from true diabetes, but it is quite essential to the proper treatment of chronic cases of diabetes. Often when the disease is actually progressing unfavorably because of marked hyperglycemia, in some cases as high as .26 or even .30 per cent, the condition is not detected because of the absence of sugar from the urine. This absence of glycosuria in spite of the marked hyperglycemia occurs not infrequently in cases of chronic diabetes as a result of a rise in the renal threshold. The danger of administering

a diet based on the urinary findings alone in these cases is obvious, for it is well-known that the carbohydrate metabolism suffers and the sugar tolerance become lessened whenever hyperglycemia persists regardless of whether or not sugar be present in the urine.

An interesting case where sugar in the urine first led to the diagnosis of diabetes, but where the blood sugar tests pointed strongly against this diagnosis, is the following:

Case 3.—Mr. A. W., aged 45, married, consulted me on April 8, 1922, because of pain in the back radiating into the abdomen, of about six weeks duration, with constipation, loss of weight and a progressive weakness. He stated that about five months previously he had been refused insurance because of the presence of sugar in the urine. An able doctor had diagnosed his condition as diabetes mellitus and he was placed on a corresponding diet, which he followed very carefully for about three months. He stated that the sugar was found in the urine on about four or five occasions. He lost about 20 pounds in weight during this treatment.

When I saw him, his physical examination revealed nothing of importance outside of some tenderness in the epigastrium and in the left inguinal region. In a series of about forty examinations of the urine, sugar was found present only three or four times.

The blood sugar gave unusual results. On the same diet, he gave .10 per cent on one occasion, .13 per cent on three occasions, and .19 per cent on another occasion. The sugar tolerance test gave an absolutely normal curve. The irregular and inconstant presence of sugar in the urine on an unrestricted diet, the peculiar, atypical findings in the blood sugar, together with the normal sugar tolerance test, practically ruled out the diagnosis of diabetes mellitus. The peculiar sugar findings both in the blood and the urine together with the persistent and continuous pain in the lower dorsal region radiating into the abdomen, the progressive loss in weight and the negative physical findings throughout the long period of observation suggested the diagnosis of a pancreatic disturbance, either stones, chronic pancreatitis, or malignancy. The latter condition seemed to me the most probable.

About nine months after the first discovery of sugar in his urine he suddenly developed jaundice. This substantiated the tentative diagnosis of malignancy of the pancreas. A laparotomy was advised. At the exploration, all the findings in the abdomen were negative except for a large, hard, almost cartilaginous mass in the region of the head of the pancreas. This completely confirmed the diagnosis of cancer of the pancreas. In this case, examination of the urine unsupported by proper blood chemical tests had made a diagnosis of diabetes mellitus, whereas the greatly varying amounts of sugar in the blood and the normal sugar tolerance test as revealed by the blood analysis precluded such a diagnosis.

John[4] in a study of 715 observations found that 99, or 13.8 per cent, showed glycosuria without hyperglycemia, and that 131, or 18.3 per cent, showed hyperglycemia without glycosuria. Such findings, which are not uncommon with most observers, demonstrate that many non-diabetic patients are being treated as diabetics, and many diabetics, especially in the earlier or pre-diabetic stage, are entirely overlooked. More extensive use of blood sugar analyses would certainly help to detect the earlier and milder cases of diabetes and would thus result in more successful treatment. Diabetes, like Bright's disease, does not develop suddenly or over night, and if the tendency to diabetes can be detected early, the diabetic problem becomes greatly lessened. When one realizes that there are about a million diabetics in the United States, one sees the great importance of such early recognition.

Acidosis.—A serious complication of diabetes is acidosis. The degree of acidosis can be ascertained by a number of laboratory methods, but the simplest one in use at the present time is that of determining the alkali reserve or the carbonic acid combining power of the plasma. As is well known, blood is alkaline which in terms of the hydrogen ion concentration is expressed as Ph 7.4. The ability of the plasma to hold and carry carbon dioxide is dependent on this alkalinity. If the alkalinity of the blood is reduced so as to approach the neutral point, its ability to combine with CO_2 is lessened and this may be determined by a rather simple test in which the Van Slyke apparatus is used. The normal combining power is from 50 to 75 per cent by volume of blood. The low normal is about 45 per cent, and below this figure the symptoms of acidosis develop. In very severe cases of acidosis the combining power of the plasma may be reduced to 20 or even 10 per cent of the blood volume.

The acidosis in diabetes results from the improper oxidation of the food consequent to the disturbed carbohydrate metabolism. This results in the accumulation in the blood of certain volatile acid bodies of the beta oxybutyric acid group.

Another type of acidosis may obtain in conditions like nephritis, acute infections, post-ether anesthesias and certain other states. The acidosis in nephritis is usually due to the retention and accumulation in the blood and tissues of non-volatile acid products of metabolism such as acid phosphates, which the kidneys are unable to eliminate because of deficient function. In many cases,

though the symptoms, such as air hunger, may be present, the condition is overlooked because of other signs of impending uremia. However, if the acidosis be recognized, as can be done by the determination of the alkali reserve in the blood, the administration of sodium bicarbonate may give definite relief, though temporary, and the patient may come out of the coma and regain consciousness. The degree of acidosis in nephritis usually, though not always, runs parallel with the degree of impairment of the renal function, but it rarely is as marked as in diabetes.

Nephritis.—The presence of high blood pressure together with certain urinary findings and a few indefinite symptoms often lead to the diagnosis of nephritis, whereas recent studies have shown that these findings may be due entirely to a condition known as essential hypertension and not to any true renal insufficiency. Blood chemistry will reveal entirely normal findings in essential hypertension except in the very late stages, while in true nephritis there is usually found increased retention products such as urea, creatinine and uric acid in varying amounts. Of course, the estimation of renal function should not be limited to blood chemical analysis alone; the PSP test and the Mosenthal concentration test are very valuable adjuncts, but the importance in the blood chemistry test, as already stated, lies in the fact that it best determines what substances the kidneys are unable to excrete, thus giving an index to the amount of damage present.

Uric acid is excreted with great difficulty and is therefore the first substance to show an increase in the blood in kidney impairment. With more advanced kidney insufficiency, urea will gradually fail of excretion. Creatinine is eliminated more readily than either uric acid or urea and it rarely rises above the normal before the quantity of urea has been about doubled.

The normal amount of uric acid in the blood is from 1 to 3 mgm. per 100 c.c. In small degrees of renal insufficiency it may lie between 4 and 10 mgm. and in some cases of nephritis it may be even higher. Urea nitrogen normally is present in amounts from 10 to 15 mgm. per 100 c.c. The high normal is 20. The quantity may increase enormously in cases of renal insufficiency, often to as high as 300 mgm. or more. Creatinine is normally present in amounts from 1 to 2.5 mgm. In advanced cases of nephritis the creatinine may rise to 10, 20 or even 30 mgm. per 100 c.c. When the quantity increases to 5 mgm. or more, the case takes on a serious aspect and unless the increase is due to some sudden acute illness, the outcome is almost invariably fatal within a short time. Not infrequently cases of nephritis present themselves which under proper dietary treatment and rest improve clinically and give the impression of a favorable outcome. However, the finding of creatinine of over 5 mgm. indicates a very serious condition with a probably fatal termination within a year or two. The determination of the creatinine in the blood in these cases is therefore of great prognostic import.

Several months ago I saw in consultation a girl 20 years old who had just been operated on for an old dislocation of the elbow and had developed definite symptoms of uremia. She had high blood pressure and had given a history of edema, and these had suggested that a blood chemistry might be indicated. However, the chemistry report was not returned until after the operation. Had the findings been known before the operation, the patient would certainly not have been subjected to the surgical procedure. The blood chemistry gave findings of an advanced case of glomerulo-nephritis, with urea nitrogen 77 mgm., creatinine 8.33 mgm. and blood sugar .156 per cent.

Under a restricted diet and other therapeutic measures she recovered from her stupor and began to feel almost entirely well. Repeated examinations of the blood, however, revealed the persistence of the retention products in large amounts, and though subjectively she felt well it is fairly certain that there will be a fatal termination within a year or two.

A similar case was treated at the University Hospital, when a young boy entered in the spring of 1920, presenting all the symptoms and findings of an advanced case of chronic glomerulo-nephritis. When he left after a stay of several months, he showed a marked improvement, giving his family the impression that he had completely recovered. The blood chemistry, however, revealed the presence of 8 mgm. of creatinine, on which findings the family was told that in spite of his apparent improvement he was still very seriously ill. He returned to the hospital in about six months, where he died a short time afterwards in a state of coma.

Another instance of the importance of blood chemistry for diagnosis is illustrated by the follow-

ing case which came to my attention through the autopsy findings.

Case 4.—Mr. F. M., aged 23, stated that he had been well up to the latter part of May, 1922, with the exception of an attack of influenza in 1919, although for several months previous to May he had not felt altogether well, having had vague and indefinite symptoms. He stated that he was voiding large amounts of pale urine. In the latter part of May he had developed sore throat with pain and swelling of his joints. On July 6 he was taken to a hospital, where he had profuse sweating, some vomiting, an irregular temperature and marked weakness in addition to the arthritis and the sore throat. About a week after his entrance he became semi-stuporous, his pulse was full and slow and he breathed heavily. His response was very sluggish and he resisted passive motion. The stupor, the joint symptoms and the symptoms of meningeal irritation increased in severity. A diagnosis of arthritis with meningeal irritation was made.

A spinal puncture was done and the spinal fluid proved negative. A number of urine examinations showed a trace of albumin, no sugar, no casts, a few red blood cells and a few leucocytes. Chemical analysis of the blood was then made with the following findings: urea nitrogren, 153 mgm.; creatinine, 11.2 mgm.; blood sugar, .26 per cent. This pointed definitely to the diagnosis of uremia. The patient died shortly afterwards, and at the post-mortem there was found a very advanced, subacute glomerulo-nephritis. This case shows that the urine can present only minor degrees of pathological findings in spite of the presence of profound lesions in the kidneys. Indeed, the urinary findings in this case had apparently been improving while the course of the disease was really progressing unfavorably. It is of interest to note that although no sugar was found in the urine at any time, there was a marked hyperglycemia present, the blood sugar being considerably above the normal renal threshold finding. This of course was due to the inability of the kidneys to excrete the sugar. Because of the meager urinary findings in this case, the final diagnosis would most probably have been incorrect were it not for the blood chemistry.

A proper differential diagnosis of the various comatose states presenting symptoms of meningeal irritation is often very difficult, but, if a blood chemistry test be made, one can at least determine whether the condition is due to either of the two more common causes, uremia or diabetic coma.

The following case illustrates how an erroneous diagnosis of nephritis may be made in cases of hypertension where insufficient laboratory tests are done.

Case 5.—Mr. H. G. B., aged 40, was seen on September 14, 1921, complaining of kidney trouble, weakness and constipation. He stated that in the summer of 1918 he was treated for stomach trouble. For the past few years he had been suffering with headaches. In the fall of 1918 he had influenza, from which he recovered very slowly. He continued having occasional attacks of distress in the epigastrium. In December, 1920, he was put to bed for two weeks on a milk diet with a diagnosis of kidney trouble. In the latter part of August, 1921, he was again put to bed on a very restricted diet for six weeks with the diagnosis of nephritis. In the middle of September, when I saw him, he was about 18 pounds overweight, and had a blood pressure varying from 158 to 178 systolic, over 108 to 116 diastolic. His heart showed moderate enlargement both to the right and to the left. There were no murmurs and no thrills. Examination of the urine repeatedly showed a faint trace of albumin with a few hyalin casts and a few leucocytes. His blood chemistry showed entirely normal findings of 2 to 2.37 mgm. creatinine, 14 to 15.4 mgm. urea nitrogen, .13 per cent sugar, and an alkali reserve of 70. The absence of renal involvement was substantiated by the other kidney function tests. The Mosenthal test showed a good concentration and the only variation from the normal was a rather large amount in the night quantity of urine. The PSP test gave 49 per cent excretion the first hour and 15 per cent the second hour, total 64 per cent in two hours.

The physical and laboratory findings therefore indicated that this patient was not suffering from glomerulo-nephritis (Bright's disease) but from what is known as essential hypertension. The treatments of the two conditions are obviously quite different. One would hesitate to put a hypertension case to bed for any considerable period of time unless there were signs of impaired cardiac compensation or of apoplexy, since absolute rest in bed in such cases tends to weaken the heart muscle rather than to improve the circulation. This patient under a regime of a slightly restricted diet with short periods of rest during the day and proper attention to the bowels has enjoyed very good health during the past year. The change in the diagnosis in this case from nephritis to essential hypertension was not made on the blood chemistry alone, but the blood chemistry was a very important factor in determining the final diagnosis.

Gout.—I wish to mention one more condition in which the blood chemistry has definite value. Occasionally it is necessary to make a differential diagnosis between gout and arthritis. In gout, the blood generally shows an increase in the uric acid, rising to from 4 to 10 mgm. per 100 c.c. In cases of uncomplicated arthritis the uric acid generally remains at about the normal figure. Of course, since uric acid is increased in other conditions such as, for example, early cases of glomerulo-nephritis, one must not rely on the blood findings alone for the diagnosis.

SUMMARY

1. Blood chemistry tests have been sufficiently simplified to make them quite generally available to most practising physicans.

2. Urinalysis reveals what the kidneys can excrete, while blood chemisty helps determine what substances fail of excretion.

3. The presence of glycosuria, even if persistent, does not signify that the patient is suffering from diabetes. Glycosuria reveals only the fact that sugar filters through the kidneys into the urine.

4. Normally there is a renal threshold for sugar, with a safe margin above the usual sugar content of the blood. This precludes the passage of sugar into the urine. In diabetes mellitus the carbohydrate metabolism is disturbed, which results in the accumulation of sugar in the blood to the point above that of the renal threshold. Glycosuria therefore results.

5. The severity of the glycosuria is not indicative of the degree of the hyperglycemia present.

6. In chronic cases of diabetes there may be marked hyperglycemia without glycosuria even when there is no demonstrable renal pathology. This condition is explained by a rise in the renal threshold, a rather common finding in diabetes of long standing.

7. Hyperglycemia without glycosuria sometimes occurs in cases of chronic glomerulonephritis.

8. Cases are not infrequent where there is persistent glycosuria with entirely normal blood sugar concentration. Some of these cases may even show a hypoglycemia. Such cases which obviously show an absence of a renal threshold for sugar are known as renal diabetes.

9. Blood chemistry in conjunction with the alimentary glucose tolerance test presents the most accurate and delicate means for diagnosing diabetes in all its stages. Often only by means of these tests can a proper differential diagnosis be made between renal diabetes and true diabetes. It is quite generally accepted that there is no diabetes without hyperglycemia.

10. Cases of renal diabetes usually do poorly under a regime for diabetes mellitus.

11. Blood chemistry is not less important to the surgeon than to the internist. By its aid one can determine, for example, when a diabetic is a good surgical risk or when a surgical procedure is contra-indicated. The same holds true for surgical cases in nephritis and with many other conditions.

12. Careful blood sugar studies are sometimes of value in diagnosing pancreatic diseases other than diabetes. A case is here reported where it helped materially in diagnosing carcinoma of the pancreas before any definite findings developed.

13. Blood chemistry tests are often of value in the differential diagnosis of comatose states.

14. Blood chemistry is of special value in determining the prognosis of advanced cases of nephritis.

15. A more extensive use of blood chemistry would in many cases result in more accurate and careful diagnoses and would also help to determine the prognosis as well as to control the treatment.

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DISCUSSION

DR. E. L. GARDNER, Minneapolis: I think it is rather fortunate that this paper has followed one discussing the training of laboratory technicians. Blood chemistry done by competent analysts, emphasizing the word *competent*, has come to stay, just as urinalysis has come to stay, but a lot of blood chemistry is being done by incompetent workers who have not had sufficient training. It should be done by well trained chemists who understand the difficulties that may arise in blood analyses.

Dr. Barron in his paper discussed a good many points but did not have time to bring them out fully. I wish to emphasize a few points for differentiating renal diabetes, renal glycosuria and diabetes mellitus. Just now there seems to be an epidemic of renal glycosuria being reported in the literature. I think we have to be careful about accepting the dictum that a low renal threshold is indicative of renal glycosuria. The cases should be tested in other ways. The patient should show symptoms and findings suggesting diabetes mellitus if diabetes mellitus is present, and, conversely, the renal glycosuria cases should be free from symptoms of diabetes mellitus. The renal threshold should be low as a rule, provided there is no nephritis in these cases of renal glycosuria. Then, too, a very important factor, the effect of diet is very slight on these cases of renal glycosuria.

The fourth point, emphasized recently by Joslin, is that these cases must be watched over several years before we can say they are really renal glycosuria. I remember a case with blood sugar running about .07 with large quantities of sugar in the urine which disappeared upon ordinary regulation of diet. This same patient, about eight months later, had a blood sugar of 0.2 per cent, typical of diabetes mellitus. We at first thought it a renal glycosuria but the test of time showed that he had diabetes mellitus.

PAINFUL SHOULDER*

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A consideration of pain in the shoulder joint, from any cause, at once suggests the importance of careful anatomical survey of this region. Without going into detail regarding the complex anatomical construction of the shoulder joint, it will be sufficient here to mention some of the important anatomical points which will help us in making a diagnosis and assist in selecting the proper mode of treatment of some of the common painful conditions of the shoulder.

1. The shoulder joint has a very wide range of motion and is attached to the thorax through the scapula and clavicle by muscles alone.

2. The glenoid cavity and humerus are not in direct contact, but the entire weight of the limb is supported by muscles and not the capsule, the capsule only acting as a supportive factor after the muscles, for some reason, have lost their tone.

3. Muscle balance is of the greatest surgical importance, for in the complex anatomical arrangement it must be remembered that it is the disturbance of this muscle balance, the result of injury or disease, which ultimately causes disability and deformity, to say nothing of the existing pain for which the patient seeks relief.

4. Certain muscles are important: the main abductors being the deltoid and supraspinatus; two important adductors being the pectoralis major and latissimus dorsi. The inward rotators are the teres major, pectoralis major and latissimus dorsi, the outward rotators of the arm being the infraspinatus, teres minor and deltoid. It will be seen that the same muscles, under certain positions of the arm and fixation of the scapula, have, in many instances, more than one function, or a complex duty, to perform.

5. In addition to the muscles and bones the bursae of the shoulder joint are important, particularly the subdeltoid, subscapular and the bursa surrounding the long head of the biceps muscle. The subscapular bursa lies between the capsule of the joint and the subscapular muscle tendon, and communicates with the joint cavity. The subdeltoid, or subacromial bursa, lies between the deltoid and humerus and muscles covering its upper anterior aspect, and does not communicate with the joint.

6. The circumflex nerve winds around the surgical neck of the humerus and supplies the deltoid muscle.

With these few anatomical facts in mind it will at once be seen that an injury resulting in pain may involve more than one structure, and what appears at first to be merely a simple sprain or contusion may, by the involvement of one structure alone, so interfere with muscle balance as to cause secondary changes.

The early diagnosis in injury of the shoulder may, by appropriate treatment, obviate these secondary phenomena. For instance, in simple strain of the deltoid, if this muscle is put at rest in abduction and the fibers not allowed to stretch, by keeping the arm in abduction, much later disability may be prevented.

If strains or sprains, such as tearing of the tendon of the supraspinatus, which frequently takes the form of a sprained fracture, or tearing off a portion of the tuberosity of the humerus, are definitely located and properly diagnosed, then appropriate abduction and position of outward rotation may allow healing without operative interference, the *x*-ray being used to aid in the decision. Unfortunately many of these minor conditions are not seen early, and the patient comes complaining only of pain in the shoulder, and from long continued fixation of the arm to the side abduction is lost, or if present the effort causes pain through the shoulder and attachment of the deltoid.

Another type of painful shoulder not involving the muscles or ligaments, but I believe constituting a simple traumatic arthritis, is that form so frequently seen in middle aged or older people who have suffered a fracture at the lower end of the radius by falling on the hand, the force being transmitted through the limb to the lax shoulder joint and a mild arthritis results.

However, the subjective complaint of the shoulder is submerged by the pain of the major injury, namely the fracture, and frequently no complaint

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is made of the shoulder as long as the arm is in a fixed dressing, and it is only after the fracture has healed and motion is attempted that the difficulty in the shoulder is discovered. At this time the trouble in the shoulder often becomes a most important factor and often prolongs the disability to a marked degree. It is in cases like the above that one should be alert to prevent fixation, or adhesions, of the shoulder and preserve power of abduction by instituting appropriate physiotherapy as soon as the acute symptoms have subsided. Diagnosis can only be made by careful examination of the shoulder as well as the forearm.

Other conditions that cause pain in the shoulder and result in fixation of the shoulder are infective processes, presumably from focal infection, causing formation of adhesions in the joint with inhibited motion. These are frequently neglected until disability becomes marked. *X*-rays may show a diffusion of the joint, and upon passive motion these adhesions may be broken up, and in many instances with appropriate massage and light treatment function can be restored. However, if the joint cartilage has been destroyed it is my experience that efforts of manipulative treatment only make matters worse. In any event the physiotherapy should be of the mildest kind.

Direct contusions of the shoulder involving the circumflex nerve with immediate paralysis of the deltoid are common injuries requiring, upon a positive diagnosis, which is not difficult in the presence of paralysis, immediate protection of the deltoid by placing the arm in a position of abduction on a platform or aeroplane splint, and instituting physiotherapy only after the acute symptoms have subsided.

There are certain painful shoulders which may give no history of injury, the subjective symptoms coming on acutely and *x*-ray pictures are negative. In this type of case let me sound a word of warning lest these negative *x*-ray findings lull one into a sense of false security regarding the actual pathology. At this stage often a diagnosis of rheumatism is made. Later, however, fluctuation in the region of the posterior portion of the joint appears and a diagnosis of periarticular abscess is now made and pain continues even if good drainage is established. Additional *x*-rays at this stage only too often show a necrosis of the glenoid cavity. Therefore, it is well in cases of painful shoulder, without history of injury, to take serial *x*-rays and be ready for more radical therapy at the first indication of osteitis.

Finally a word about subdeltoid bursitis. Patients complaining of pain in the shoulder, with or without history of trauma, may be the subject of bursitis. Since Codman first drew attention to this structure the diagnosis of subdeltoid bursitis has become much of a fad, much like as Lovett has already stated that the stock diagnosis of sacro-iliac dislocation enjoys a marvelous popularity if pain is present in the proper locality. However, Codman stated that it was his opinion that most minor lesions of the shoulder joint involve the bursa and few involve the true joint, and it is my experience that this lesion is not at all uncommon. While frequently it recovers irrespective of the treatment, it is those cases where symptoms persist that require our attention.

The diagnosis frequently brought by the patient is rheumatism, sprain or neuritis, or possibly a history of trauma. Local tenderness is complained of directly under the deltoid. Sometimes swelling occurs, but in essential bursitis there is no atrophy of the deltoid, even if abduction is somewhat inhibited, providing there is no circumflex nerve injury accompanying those cases of bursitis following injury.

X-ray pictures may be negative, but not infrequently in the non-traumatic cases a calcareous, or gelatinous, gummy deposit shows in the *x*-ray, occupying the deep layers of the bursæ, and these deposits may take various forms and be of such size as to actually cause pain from pressure, either on the deltoid when contracting in front or pressing on its abductor partner, the supraspinatous tendon lying beneath.

The treatment of these cases with negative *x*-rays is largely that which comes under the head of physiotherapy, after the acute symptoms are over. In the meantime abduction for protection of the muscles, namely, the deltoid and supraspinatus, should be instituted. If, however, the *x*-rays show deposits, operative procedure is indicated, and the slide I am showing you today is of a case (Fig. 1) where the patient made a complete recovery following removal of the calcareous deposits.

One cannot discuss this subject without admitting that there are types of painful shoulder where

Fig. 1. Calcareous deposit directly below the acromial process, which gives the appearance of being an exostosis, but proved to be a deposit in the deep layer or posterior wall of the acromial bursa.

after the most careful study a diagnosis cannot be made. These usually occur in unstable, neurotic young women and follow a minor injury, present no definite signs of neuritis, or atrophy, but persistent subjective symptoms continue, irrespective of the treatment, until the physician, if not the patient, is worn out.

In conclusion let me emphasize the importance of attempted accurate diagnosis, particularly as regards the muscle balance involved, and protect stretched muscles as early as possible; also the great importance of treating these cases by physiotherapy and medical gymnastics, not only for the result to be obtained therefrom, but because in this day and age the cults, which are springing up about us, are accomplishing, through their efforts of treatment, things which we have neglected in the past through our efforts alone in diagnosis.

DISCUSSION

Dr. Emil S. Geist, Minneapolis: Regarding the important subject which Dr. Wilcox has presented, one might spend much time in discussing it, but I shall not do so. There are a few points one might consider.

The first one he made was regarding injury to the shoulder with Colles's fracture. It is not an uncommon thing to find a stiff shoulder in an old woman who has fallen upon the ice and has sustained a typical Colles's fracture. It ought to be a routine with us who are treating Colles's fractures to examine the shoulders of the patients.

As to injury to the circumflex nerve, I have seen two or three cases of distinct paralysis from a fall on the shoulder where paralysis of the circumflex nerve followed, and it is not an uncommon thing at all.

Regarding the calcareous bursa that the doctor showed on the *x*-ray, I have operated on several of these cases. I had a case of much more marked "calcification" than the one shown. I was anxious to operate but the patient did not consent. Since then, that bursa disappeared, as verified by *x*-ray, and that has been my experience several times since with other cases.

Regarding the question of splinting an injured shoulder, I think our tendency ought to be, in nearly every case, to put on an abduction splint. I believe the sling is the enemy of the shoulder. We should use the abduction splint more freely and I believe our results in fractures, sprains and other injuries about the shoulder will be better.

Dr. M. S. Henderson, Rochester: I cannot resist saying a few words on this subject as the condition is relatively common. Patients come to us with painful shoulders and we do not know exactly what to do for them. These patients may be arbitrarily divided in three groups. First, patients with a painful shoulder and no physical findings. They tell us they cannot sleep at night; they cannot lie on the shoulder. It is difficult to make a diagnosis; the *x*-ray is negative. You may take out the tonsils and extract the teeth, but often that type of shoulder goes on to the second group, namely, the stiff shoulder. The patients cannot lift the hand to the back of the head or put it into the hip pocket, or put it to the waist line posteriorly. In some of these cases of stiff shoulders we put the patients to sleep under ether and break up the adhesions. You can feel the adhesions break as the arm is manipulated. Ether is the best anesthetic as the patients may be returned to bed and the arm fastened to the top of the bed before they awaken from the anesthetic. Physiotherapy consisting of baking, massage and the encouragement of active motion is helpful in the convalescent stage. There is one other type, the third, in which, as Dr. Wilcox has shown, there is a real lesion to be seen; a calcareous deposit in the bursa. My experience has been similar to that of Dr. Giest in that these patients may go on and get well, and later the *x*-rays may show no evidence of calcareous deposit in the bursa. Certain patients, however, should be operated on.

Dr. Wallace Cole, St. Paul: Stiffness of the shoulder following wrist fractures is so common that I like to tell patients about it, and point out to them the importance of starting to move the arm up and down. I consider the pathology there probably what Dr. Thomas described, that is, when the arm is at the side the lower portion of the capsule of the joint is covered. If there is a traumatic arthritis, effusion takes place and the capsule cannot be stretched out. If we start early with abduction we prevent the gluing together of the capsule so that we can prevent it later.

THE PRESENT STATUS OF MEDICAL OPINION CONCERNING THE NATURE, DIAGNOSIS AND PROGNOSIS OF ENCEPHALITIS EPIDEMICA*

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The profusion of medical literature on this subject during the last few years is in itself somewhat confusing. This is no reflection on the literature but rather only another form of expression denoting the multiplicity of types, the great variation in virulence of attacks, remission, exacerbations and the numerous sequelæ with which this most protean of diseases exhibits itself to different observers.

The object of this presentation is rather in the nature of a "rundschau" of the medical literature on such questions as to whether this disease is a separate entity, whether it is infectious and contagious, the nature of the causative factor, also a general discussion of the nervous pathology, general symptomatology, diagnosis and prognosis.

Ferdinando Micheli discusses the discovery of Bastai as well as the experimental researches of Strauss and Löwe, Noguchi and Flexner. He speaks of the interesting experiments in which cats have been inoculated with the encephalitic virus and are affected with similar lesions and a similar symptomatology to that found in men. This author concludes that epidemic encephalitis is a separate entity, the causative factor of which most frequently gains entrance into the system through the region of the nasopharnyx, that its virus is like the virus of poliomyelitis, filterable and perhaps under certain conditions visible, and culturable.

A case of probable transmission of the virus of encephalitis by a person who had been affected with the disease for three years is reported by A. Lumierre. A discussion of this case was participated in by Netter, Martin, Canby and Sicard. The opinions were expressed that encephalitis is an infectious disease although the transference is difficult to demonstrate; also that the virus can persist for a long time in the nerve centers and at various times cause exacerbations.

P. Harvier and C. Levadite report a case of encephalitis in which the nerve centers were virulent after a period of six months. This was demonstrated by the injection of the virus into guinea-pigs, which died three weeks after the injections with symptoms of the disease.

Thalheimer in a preliminary communication reports confirmation of the studies of Strauss and Löwe, that the virus of encephalitis is a filterable one, that it resembles somewhat the virus of poliomyelitis; but contrary to this is demonstrable in the spinal fluid and is also transmissible to guinea-pigs.

C. Levadite and P. Harvier state that the virus of encephalitis will live in milk in ordinary temperatures at least sixty days and in water five days. They, therefore, conclude that milk and water may play an important rôle in the spread of epidemics.

The report of a commission appointed by the Paris Academy of Medicine on the contagiousness of encephalitis is interesting. They conclude that the danger of contagion is not great, but nevertheless undeniably exists even in chronic cases which have lasted for years, also from healthy carriers having contact with encephalitic cases, as well as objects such as clothes, the washing, etc. The infection occurs through the nose and mouth.

Carl Kling and Liljenquist Folke after a careful study of a number of epidemics in Sweden conclude that a catarrhal condition of the upper air passages occurs in every case. In the mild cases presenting these catarrhal symptoms no evidence of organic disease of the brain is to be discovered. Since these mild cases are the most numerous and are usually not recognized as an expression of encephalitis, effective measures to stop the spread of epidemics of encephalitis are almost impossible to carry out.

H. Rogers and Andre Blanchard in an article on the contagiousness of encephalitis refer to the numerous observations on the subject, notably the occurrence of encephalitis in twelve out of twenty-one persons in an English boarding house within a week, with four deaths. The most dangerous carriers are the ambulant forms (formes frustes). It is impossible to isolate the chronic types of years duration which are also considered as carriers.

THE PATHOLOGY

The pathological reports of all observers seem quite uniform. The basal ganglia and the nuclei of the cranial nerves are the points of predilection.

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The meninges and the spinal cord are sometimes affected. The minute changes in nerve tissues consist of glia proliferation along with perivascular infiltrations of the basal brain ganglia of which the corpus striatum seems to be the one most frequently and seriously involved.

CHANGES IN THE SPINAL FLUIDS

In an article on the serology of the spinal fluid in encephalitis epidemica by Kraus and Pardee, the authors state that as a rule the spinal fluid shows considerable and important changes which they classify as follows: (1) a clear colorless fluid: (2) an increase in pressure; (3) an increase in the mononuclear cells; (4) an increase in the globulin; (5) an increase in the amount of spinal fluid sugar; (6) a negative Wassermann; (7) the presence of bodies producing a change in color of the colloidal gold solution.

In 120 of their cases the globulin content was increased in 72 per cent of cases. In twenty cases during the first week of the disease the maximum cell count was 160, the minimum 2, the average 63.3. The sugar content tested in twelve cases was 0.0062 to 0.095 per cent.

In five of our own cases during the acute stage the maximum cell count was 80/3, the minimum 3/3, the average 26.6. The Nonne was a plus 1 in four cases, negative in one. The pressure was increased in two cases. The gold solution was changed in three cases, the most marked changes occurring in the higher dilutions. There was no change in two cases. In a fatal case with many somatic symptoms of severe involvement of the basal brain ganglia with fever as high as 103 and marked neck rigidity, the only deviations of the spinal fluid from the normal was in the colloidal gold curve.

The spinal fluid examination in this disease as in all others has its greatest significance in diagnosis when contrasted with the clinical picture.

In a patient suddenly stricken with headache, neck rigidity, fever, delirium, semi-consciousness and a lethargic state, the diseases which come most into consideration in differential diagnosis are cerebro-spinal, tuberculous and syphilitic meningitis, polio-encephalitis and encephalitis epidemica. Under these conditions a 1 plus Nonne and a very moderate cell increase eliminates at once both the first mentioned affections. In differentiating between polio-encephalitis and encephalitis epidemica, in the majority of instances, the distinction will have to be made from other symptoms, as the spinal fluid pathology may be quite similar in both.

Moderate changes in the spinal fluid with severe clinical symptoms in striking contrast to the degree of spinal fluid change would be strongly in favor of the diagnosis of encephalitis epidemica in a distinction between it and any one of the above mentioned diseases except polio-encephalitis.

In syphilitic meningitis cases where the Wassermann reaction is negative, a differentiation based on the spinal fluid content alone, in the writer's opinion, is often impossible. We are able to recall seeing two cases in both of which a typical lethargic state existed where the spinal fluid findings were essentially the same but a further observation revealed the one to be of syphilitic origin, the other encephalitis epidemica.

Differentiation of the spinal fluid pathology between this disease and brain tumor, cyst or abscess would, in many instances, also be impossible. How could anyone exclude brain tumor, cyst or even abscess in one of our fatal cases with an increased pressure, a plus 1 Nonne and a cell count of 3/3, all lymphocytes.

To summarize, there is nothing a spinal fluid examination reveals which can be said to be pathognomonic of encephalitis epidemica. The spinal fluid content has characteristics which, construed in connection with the history and symptomatology, may be very valuable.

The degree of increase in both the cell count and globulin content is usually much less than in other diseases, severely and acutely attacking the nervous system.

In the most severe cases the pressure may show very little or no increase. The globulin content may be expressed by a mild positive and from ten to twenty lymphocytes per c.mm. enumerates the cell increase ordinarily observed.

Concerning the collodial gold reaction Davis and Kraus say that in forty-one per cent of their cases the reaction showed deviations from the normal.

The variations in the gold curve indicated no relationship between the severity, duration or the clinical picture exhibited by the disease.

SYMPTOMATOLOGY

In a report on 255 cases, H. F. Smith states that 14.92 per cent of the cases occurred in children un-

der five years, 27 per cent between the ages of five and twenty and 56 per cent of the cases were over twenty, while in 5,553 cases of poliomyelitis the corresponding percentages were 68.9 under five years, 28.3 between five and twenty, and 3.5 over twenty years of age. In 29 per cent the onset of the disease was sudden, in 71 per cent gradual. The more acute the onset, the worse the prognosis. The percentage occurrence of the most prominent symptoms were: headache 87, sensation of fatigue 84, fever (mild in character) 98.5, vertigo 77, visual disturbances 72, diplopia 83, strabismus 77, ptosis 95. In 85 per cent of the cases some degree of aphasia was observed, from the slightest degree to a complete loss of speech. The most common speech defects were those of dysarthyria. Such symptoms as disturbances of the reflexes, pupils, paralysis of the cranial nerves, retention and incontinence of urine, tremor, chorea, rigidity, paralysis of the extremities, occurred frequently. In thirty-five cases the globulin content of the spinal fluid was a plus 1. In 159 cases 29 per cent were fatal.

Lionello de Lisi, in an article concerning the Parkinsonian type of encephalitis, says that it most resembles paralysis agitans, *sine agitatione*. The cardinal symptoms depend on changes in the globus pallidus, also on lesions in the association fibres between the cerebellum and the rubrothalamic and thalamic fillet tracts.

Max Kirschbaum describes four cases in which anomalies in personality were noticed. Defects in intelligence were absent. In three cases there developed an incorrigibility and an asocial type of conduct which was in sharp contrast to the former good behavior of these children. In one case there was the picture of a moral insanity, another exhibited a hypo-mania; concerning the prognosis in such cases he has nothing definite to say.

Pette in an article on the course and prognosis of encephalitis says that he has observed numerous cases in which there was a varying interval up to one and one-fourth years between the acute attack and the beginning of the Parkinsonian syndrome. Also cases which were so light, some ambulant, in which the disease was not recognized and the severity of the later developing nervous symptoms were out of all proportion to the initial attack. This author reports six cases which apparently made a complete recovery and were for a long time fully able to pursue their former occupation before the Parkinsonian manifestations appeared. It appears possible that the virus of encephalitis maintains its virulence in the system over long periods of time. If this is true, prognosis in encephalitis ought to be very guarded, since everyone who has passed through an acute attack carries within his system a volcano which at any time may start to erupt and cause serious disturbances to its possessor.

Artur Sarbo had an opportunity of studying twenty-five cases, not only during the acute attack but over a year afterward. Of the twenty-five cases, four died, one of which was a pregnant woman; six recovered; in fifteen cases sequelæ of various kinds occurred. One of the most interesting cases was in a professor thirty-two years old who during the acute stage had a bilateral facial paralysis and a lethargic conditions of six weeks duration out of which a chronic state developed, the most striking symptom of which was an exceedingly rapid exhaustion of the musculature which manifested itself after every movement, even on sitting down. In this case the myasthenic electro-reaction was demonstrable for a long time afterward. The most prominent nervous sequelae were amimia, rigid posture with tendency to an inclination forward of the head and upper part of the body, hypertonia of the head and neck musculature, retardation of voluntary movements, monotonous speech, as well as an absence of any disturbance of the reflexes. The psychic disturbances manifested themselves chiefly by the absence of any initiative, the patient sitting hours at a time speechless and motionless. The intelligence remained for the most part intact.

In ten of our cases which we had an opportunity of studying very carefully because they were hospital cases, four were of the Parkinsonian type, of which three were *sine agitatione;* one had a marked tremor. The most troublesome symptom in two of these cases was that of difficulty in chewing and swallowing; after they had been eating for a little while there seemed to be not only a muscular exhaustion of the muscles of mastication and deglutition but also a complete inability to co-ordinate these and they were unable to get the food either down their throat or out of the mouth. It simply stuck there with the patient being unable to propel it one way or the other. Another one of these patients could talk and walk quite well early in the morning but along towards nine or ten o'clock was unable to do either, which had caused her trouble to be diagnosed as an hysterical condition. These particular symptoms are interesting because they

suggest the myasthenic type of reaction mentioned by Sarbo in addition to the Parkinsonian syndrome. Two of these patients were men and two women; the ages of the men were 47 and 52 years, the women 21 and 35. In the man 52 years old, whom I have had an opportunity of observing for a period of four years, there have been apparently no relapses or progression of symptoms. After the first three months he has been continuously at his former work, clerical in character. In the girl twenty-one years old whom I have observed for three years no true progression has occurred. She varies greatly in her ability to walk and handle herself at times but this variation in capacity suggests rather muscular exhaustion. Rest restores her to her best level of muscular attainment, while over-exertion makes her quite helpless. An analogous situation is seen in heart cases where this change in muscular tone is designated as compensation and decompensation.

We wonder how many cases similar in some degree are manifesting this same tendency to muscular exhaustion never before experienced by the patient until after an attack of influenza which was in reality encephalitis and are being classified as neurasthenia and psychasthenia? We feel quite sure we have seen a few. The patient thirty-five years old whose attack was in December, 1919, and was thought at the time to be a nervous breakdown, has experienced undoubted remissions and genuine progressions which no other explanation could possibly explain.

In two of the cases in this series the onset was manifested first by a headache of several days duration followed by a sudden and complete hemiplegia, apoplectic in character. Both of these cases were women, aged 32 and 33 years. Both died. The first case was continuously progressive in character passing through the lethargic and temperature stages, death occurring during a condition resembling catatonia. At the time of her death she had both hallucinations of hearing and sight. She was taken sick July 10, 1920, and died December 3rd of the same year. The spinal fluid examinations of this patient were interesting. On August 14th, the date of her admission to the hospital, the macroscopic appearance of fluid was smoky, due to appearance of blood; the pressure was a plus 1, the Nonne plus 1, the cell count 2,900 per c.mm. of these, 2,000 were red blood cells, 900 white; of the white 95 per cent were of the p.m.n. variety, 5 per cent being lymphocytes. Neither stained specimens nor cultures showed any organisms. On September 18th with no improvement in the clinical picture, except the temperature, the spinal fluid was in macroscopic appearance clear, the pressure a plus 2, Nonne negative, cell count 6/3 (all lymphocytes). In both instances the colloidal gold curve showed changes in all dilutions: in the first fluid the great variation was manifested in the lower dilutions; in the second these were observed in the higher. The Wassermann was negative. The second case began in April of this year with headache, then double vision, and finally a hemiplegia with dysarthyria. This patient in the beginning was an office patient seen first June 29, 1922. No positive diagnosis was made. The diseases in differential diagnosis which were most seriously considered in this case were cerebro-spinal lues, encephalitis epidemica and multiple sclerosis. She was placed on specific treatment and at first made decided improvement so that she was able to resume her household duties. On July 19th she came to the office complaining again of headache, with all old symptoms much worse and new ones appearing such as ptosis and double vision. She went to the hospital the next morning and rapidly sank into a typical lethargic state with temperature varying from 99 to 102. She died on August 2nd. This patient had her initial attack in April, ran a mild course with a distinct remission until July 19th, when while under specific treatment and for no apparent reason she got an acute exacerbation which progressed to a fatal termination two weeks later. On July 20th, the date of her admission to the hospital, her spinal fluid examination was: pressure normal, Nonne negative, cell count all lymphocytes 3/3, colloidal gold 112221000. The wide variation of the spinal fluid findings in these two cases, both in an acute febrile stage, is interesting.

Another patient of this series, male aged 21, represented the delirious type. This patient was referred to us as an acute psychosis. He had a typical occupational delirium, also a fine generalized tremor much like that seen in delirium tremens. His neck rigidity was so slight that we were not sure of it. Sometimes we thought it was present and sometimes not. The history of the onset in this patient was interesting. One day he quit work as cashier in a bank and went home because

of headache and nervousness. He imagined money was being passed around and spoke of an adding machine having some evil influence over him. There was no disturbance indicating any organic disease of the nervous system except the generalized tremor spoken of before and a slight hypertonicity of the entire body. The patient ran a temperature which varied between 99 and 104. His spinal fluid examination on entrance was pressure plus 1, Nonne plus 1, cell count 18/3, colloidal gold no change, Wassermann negative. This patient was admitted to the hospital February 19, 1920, and died rather suddenly on March 9th, when it was thought he was improving. The clinical picture presented resembled more that of an acute mania.

Another case, male, aged 21, whose onset was two years before, presented the nervous sequelæ of coarse choreiform movements involving both the face and upper extremity.

Of the other two cases, one was a boy of fifteen who, two years ago, according to the history, had a sickness which seemed peculiar at the time, in which for a period of six or seven weeks he wanted to sleep. One expression his mother made was especially descriptive of the lethargic condition. She said by shaking and exertion they could rouse him up so that sometimes he would come to the table and eat a good meal. When he had finished eating he would go back to bed and go to sleep again. During the first week of this sickness the case was said by one physician to be rheumatism, by another "flu." After the lethargic state passed off it was followed by a period of insomnia and restlessness. Before this illness the boy was a normal boy. At the age of twelve he was in the fifth grade. His general behavior was such that it caused no especial comment. After this he was completely changed. He has been two years in the fifth grade and his teachers report that he makes no progress whatever. Last spring his parents were told he would not be received in the school any more because his conduct was so bad the discipline of the whole room was destroyed and it seemed impossible for him to learn. The mother said at home he was noisy and loud, disobedient to her and rough and mean to his two brothers.

In the office his antics made examination difficult. He called the examiner "Doc," appropriated immediately the examiner's chair, picked up his fountain pen and proceeded to take it apart. The individual qualities of intellect as shown by his alertness of response in answering questions and the correctness of his answers, rated his mental age between that of nine and ten. In other directions, such as ability to concentrate, any realization of the grotesqueness of his own behavior and a general sense of the proprieties, a baby of three would have put him to shame. An impossible personality would seem to be the designation which described his conduct the best. His features are coarse and his movements clumsy. Otherwise both the physical and neurological examinations were negative.

The last case of this series presents a number of points of interest which, in order to bring them out properly, will be presented as nearly as possible as the case developed itself to us.

Patient, male, age 40, married, occupation physician. He was seen first January 21, 1921. Family and personal history were negative. Up to date of the present illness this patient had been an unusually active and hard worker. The history of present illness obtained at that time was as follows:

Patient broke down nervously two years ago with symptoms of depression, insomnia, a lack of confidence in himself and a general feeling of fatigue and exhaustion. He attributed his condition to overwork and thought that a vacation was the thing that he needed and so he went with his family to Florida for a vacation of some six weeks. In relating an incident which occurred there, he speaks of both a fear and apathy to any effort, either mental or physical, but especially physical, which has been and still is such a formidable and prominent feature of his case. His vacation failed to bring him the expected relief from this feeling of fatigue. So after his return home he consulted a medical clinic in order to try and ascertain what his trouble was. In the course of his examination at this clinic a spinal fluid examination was made, and he was told that the Wassermann reaction was positive in his spinal fluid, as well as having also a positive Nonne and a considerable degree of increase in the cell count. Upon these findings a diagnosis was made of cerebro-spinal lues. He was given some nine or ten intravenous doses of salvarsan as well as a number of intraspinous doses of salvarsanized serum. Along with this treatment mercurial injections were also administered. After these treatments the Wassermann reaction in his spinal fluid was said to have become negative. An improvement occurred in the other findings as well. The improvement was wholly seriological, how-

ever, no improvement whatever taking place in his symptoms. He was then advised to seek sanitarium treatment for these symptoms and came to us. At this time both his physical and neurological examinations resulted in negative findings. His serum Wassermann was negative. His spinal fluid findings were: pressure normal, Nonne a plus 1, cell count 7/3, Wassermann negative in 1 c.c., colloidal gold 0011100000.

The picture he submitted to us during his entire stay was a typical one of a neurasthenic state. One symptom which stood out above all others was a dread of physical exertion. He had to be constantly urged to effort in this direction and under considerable pressure took sometimes walks of several miles, drove his own car and played various games such as quoits and croquet. He was of an athletic type and in a jumping contest among the male patients outclassed them all. Always, after these exercises, he complained bitterly of fatigue and when he returned to his room threw himself on the bed because of his utter exhaustion. At this time he was gaining in weight, his blood count and hemogoblin were normal and to us there were no manifest reasons to explain this extreme exhaustion, of which he complained continually. He was tested carefully for the myasthenic reaction with a negative result. On July 1, 1921, he returned home with the firm intention of overcoming his subjective symptoms and taking up his work. He tried to do this for several weeks but gradually dropped back to his former apathetic and listless state.

A short time ago his wife wrote us saying she wished we could see her husband again, that he had changed in so many ways since he was here last year. Remembering the history of a positive spinal fluid Wassermann which was given us, we felt he ought to return for another spinal fluid examination, since he had received no specific treatment since that mentioned before. On September 25, 1922, he returned. This time the spinal fluid findings were: pressure normal, Nonne questionable, cell count 5/3, Wassermann negative in 1 c.c. and colloidal gold practically the same as in the first instance. The serum Wassermann was also negative. The change in his appearance was so great that it gave us a distinct shock. The mask-like expression, the slowness in speech and movement, the general muscular hypertonicity, the position of the hands, the peculiar gait and a drooling, could leave no doubt of the Parkinsonian syndrome. The old symptoms of general apathy were all present. The sensation of fatigue after effort seemed rather to have increased than diminished. The patient had gradually eliminated effort of any kind almost entirely. He had quit his interest in reading, in current events, and did practically nothing all day long. His intelligence seems to be about the only quality unimpaired. Of initiative he had none. When asked why he had surrendered himself so completely to this general inertia and did not at least do the things which he could do for his own peace and comfort of mind, such as reading, walking, visiting and playing games of cards and checkers, he was unable to give any adequate explanation. When asked if it was the fear of the feeling of fatigue following such efforts, he said he did not know, perhaps it was. A few notes from his daily hospital record while at the sanitarium a year ago will perhaps best describe his condition while there at that time. "Patient had a very good night, appetite good, complains of tired feeling. Spent most of afternoon outside. Walked thirty-two blocks. Still feeling tired in the evening. Patient had a good night but does not feel rested. Pitched horseshoes, walked thirty-four blocks." On the day following this, after a good night, patient complained of being fatigued all day. Spent most of the day in bed. Walked fifteen blocks. There were very few days in which a complaint of feeling tired or fatigued was not recorded. In addition to this there was always frequent complaint of headache, not more, however, than the ordinary neurasthenic is apt to complain of. The patient was not infrequently depressed and often broke down and cried. All these daily activities were only accomplished as a result of constant urging. If, at that time, he had been left to himself, to follow his own inclinations, as the subsequent history of his case shows after he had returned home, he would have succumbed to both a physical and mental lethargy. During all this time, a period of some four or five months, there was not a single somatic symptom that we were able to demonstrate. He was discharged on July, 1921, in what seemed to have been splendid physical condition, under the diagnosis of psychasthenia. When he returned in September, 1922, with the well developed Parkinsonian syndrome we felt there must be a history of initial onset and so began again with the beginning of his breakdown. The taking of his history again is especially interesting in seeing how

easy it is to miss the vital point in the beginning of an illness, even though one tries to be careful to acquire it. The first time we had asked him if he had had "flu" or influenza recently. On receiving a negative answer we had let the matter drop there. This time, the very distinct impression that there must have been a beginning to cause this syndrome, more definite and positive than just overwork, caused us to inquire more carefully into his life during the two weeks before he quit work.

In the first week of December, 1919, while working hard and taking care of "flu" cases, he experienced an irrepressible feeling of sleepiness during the day which he does not remember of ever having had before, no matter how hard he had been working. He would go to sleep in his office while talking to a patient, wake up, go on talking and then drop to sleep again. At night he was unable to sleep well. During this period of lethargy he recalls a daily headache. He attributed these symptoms to overwork and because of them went the next week for a visit to relatives to get a little rest. While on this visit he developed a left facial paralysis which entirely disappeared after a few weeks. A medical consultation did not furnish him at that time with any adequate explanation of his facial paralysis. Here, then, was a perfectly good history of the initial onset, although ambulant in type, of encephalitis epidemica. Later on, after his spinal fluid findings resulted as they did, these symptoms were attributed to his cerebro-spinal lues.

The very unusual features of this case to us are: (1) the mild and ambulant form of the initial attack; (2) the severe and progressive type of the nervous sequelæ entirely out of proportion to the mildness of the acute attack; (3) the lateness of appearance of the first symptoms of the Parkinsonian syndrome, a period of two years and a half; (4) our own inability to make a correct diagnosis, even though subjective symptoms were numerous but misled us entirely because of their wholly subjective and neurasthenic character until this syndrome had developed itself.

J. Ramsey Hunt, in an excellent article, stresses the frequency of the striadal and thalamic type of encephalitis. He distinguishes: (1) the palaostriate or pallidary syndrome type of paralysis agitans; (2) the neo-striate syndrome (nucleus caudatus and putamen), the choreic type; (3) a mixed striate syndrome, clinically a combination of the Parkinsonian and choreic types. In the first group the type of predominance is paralysis agitans *sine agitatione*, also cataleptic types with tendency to progression of symptoms and inclination to relapses, and finally combinations with pyramidal symptoms. In the second group he recognizes an acute form accompanied with delirious and other psychotic symptoms, a form with choreic athetoid movements, also a rhythmic chorea which by slow rhythmic movements is manifested in one or more extremities.

Laignel-Lavastine described more particularly the psychic types in encephalitis. He distinguishes: (1) the lethargic; (2) the delirious; (3) the epileptic (either Jacksonian or general epileptic attacks); (4) the manic, usually short in duration; (5) the depressive, which especially seems to follow the lethargic phase; (6) the hebiphrenic-catatonic. It may be added that the same patient may exhibit any one of these so called types in the different stages of the disease.

In children tics and spasms play a rôle.

DIAGNOSTIC CRITERIA

In an article entitled "Diagnostic Criteria in Epidemic Encephalitis and Encephalo-Myelitis," Barker says "the occurrence in a patient of (a) pathologic drowsiness (lethargy), (b) cerebral nerve paralysis (especially opthalmaplegia), (c) an acutely developing Parkinsonian syndrome, (d) a cataleptic or catatonic state, (e) myoclonia or chorea, (g) pupillary disturbances, (h) violent neuralgias, (i) a poliomyelitis syndrome, (j) a peculiar delirium, (k) a psychotic state or signs of meningeal irritation when encephalitis is epidemic should make one think of the possible existence of this disease." The organic types have in the past few years been so well described that their recognition ought not at present to be difficult. It is in those cases where somatic symptoms are lacking and the chief complaints are either entirely subjective in character or manifest themselves only as psychic and character anomalies apparent only to the environment of the patient, which present the most difficult problems in the diagnosis of this disease at present.

SUMMARY

A review of the literature on this subject, which our own experience corroborates, clearly indicates that the consensus of medical opinion at the present time considers this disease as a separate entity; also that it is infectious, that the most probable

causative factor is a filtrable virus, which can be transmitted by inoculation to certain animals, notably the cat, guinea-pig, rabbit, monkey, etc., and that it can be grown in a suitable culture medium.

The disease usually enters the system through the nose and throat and its spread from one person to another most probably takes place by contact with the naso-pharyngeal secretions of infected persons or healthy carriers in whose naso-pharyngeal secretions the virus is present. It is thought to be also contagious, is transmissible without active contact but the danger of this is slight as compared with its infectious properties.

The acute attack in many instances is only the beginning of a chronic progressive disease of the nervous system manifesting remissions and exacerbations. The acute attack may be so mild that it is of the ambulant form but the mildness of the onset is no guarantee against the later development of serious nervous sequelæ; for this reason caution in the prognosis is indicated.

These chronic nervous types are still capable of acting as carriers.

Of the nervous sequelæ the Parkinsonian type seems the most common; here intelligence defects are comparatively rare.

Psychotic sequelæ are not unusual and exhibit a wide variation in type from cases presenting the schizophrenic reactions so often occurring in dementia precox and manifesting marked intellectual and moral defects, to milder forms resembling more a neurasthenic or psychasthenic character.

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DISCUSSION

Dr. C. Eugene Riggs, St. Paul: Dr. Ball has clarified much that is vague and confusing in the literature of encephalitis lethargica and his viewpoint of this disease is clear and well balanced. According to Dr. Bassoe, little new has been added to our knowledge of the etiology, pathologic histology, symptomatology and treatment of encephalitis lethargica. It was my privilege to make the first case report of this affection in this state. Later, before Ramsey and Hennepin County Medical Societies, I called attention to the chronic forms and the classification of this disease; as to the former, Netter believes that it (encephalitis lethargica) is "a direct and continued action of the tenacious virus"; in this way explaining the exacerbations sometimes after apparent recovery and the existence side by side of old and new lesions (Bassoe). Only a virus remaining latent for months or years can account for this symptomatology.

Classification by clinicians of clinical forms and standardized groups cannot be made. Bramwell says that "an adequate and satisfactory classification which corroborates the clinical phenomena with the anatomical distribution is not possible." One can only keep in mind the outstanding symptoms with their subsidiary details. In chronic forms I have emphasized asthenia as a prominent symptom. Dr. Ball, in his paper, has reported four cases which are graphic illustrations of the myasthenia-gravis syndrome. The Parkinson syndrome is of common occurrence; it usually assumes the rigid form. It may develop during the acute attack or several years later. Catola has never seen a recovery. Courtney states that he has once observed this to occur. One of my patients during sleep, just on the moment of awaking (he was unable to walk unaided or talk), would walk naturally and converse in a perfectly natural manner. After a few moments he would relapse into rigidity and silence.

The mental disturbances are varied and are so many expressions of toxemia. Delirium is often the most prominent symptom. There may be simply sluggish mental reflexes or the manifestation of dementia precox and the manic-depressive syndrome; the latter are the expression of a latent taint revealed by this grave affection in a psycho-

pathic patient. The serologic findings have no pathologic significance. Cell increase is moderate; globulin is commonly present. Increase in sugar content has diagnostic significance. Pressure may or may not be increased. While the goldsol reaction is generally that of lues it may vary from 0 to the paretic curve. As to the blood, there is frequently a mild leukocytosis. The average count, according to Krause and Pardee, of their cases, is 12,000. The consensus of medical opinion is that lethargic encephalitis is an acute infectious disease, a distinct entity, that it is caused by a filterable virus, transmissible to certain animals, demonstrable in the spinal fluid. This virus gains access to the organism through the naso-pharynx. It may remain latent for months or years. Exacerbations have been known to occur as late as a year and one-half after the acute attack.

Dr. S. Amberg, Rochester: It would be presumptuous for me to take sides in the controversy that is going on in regard to the etiology of encephalitis, but I do not think the question is definitely settled. I was much interested in the paper of Dr. Ball. We have seen some very interesting cases in Rochester. There were some cases of paralysis agitans, in one of which the tremor was pronounced and in the other not quite so pronounced. We have seen cases accompanied by intense insomnia, and one series of cases engaged our interest to a great extent. We have about eleven or twelve cases of what we call the respiratory syndrome, some of which have been reported by Dr. Parker, and they have been noted by other men. It is a very remarkable picture. All of these have been in the fifth to the sixteenth year. The children sit or stand and all at once throw the head back and in most instances stiffen out, and this attack is accompanied by a rather rapid, loud and unusual respiration. This is a very peculiar and striking picture. Most of these cases have been associated with a certain amount of mental deterioration.

It certainly is well, as Dr. Ball has pointed out, to be very guarded in the prognosis of epidemic encephalitis.

UTERINE FIBROMYOMAS COMPLICATING PREGNANCY*

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Approximately one in eight white women and one in three colored women who reach the menopause have uterine fibromyomas. According to Stacy, 31 per cent of women with these tumors are sterile, whereas sterility from other causes is found in only 10 per cent. Conversely, sterility seems to be a factor in the production of some of these tumors.

Uterine fibromyomas are not an uncommon complication of pregnancy. Spencer says that they occur once in every 150 pregnancies, and cites Pinard as finding eighty-four in 13,915 pregnancies and Pozzi, eighty-three in 12,050 pregnancies. Comparatively few women with these tumors have symptoms, and not many women who become pregnant have symptoms as a result of the tumor.

A group of 101 patients in the Mayo Clinic who had fibromyomas complicating pregnancy have been studied. Seventy-five per cent had symptoms resulting from the tumor, although only about half of the patients were aware of its presence. A smaller number came because of other complaints, not the result of the tumor. Since all of these patients sought relief from illness or tumor, statistics based on their complaints may not be comparable with those coming from obstetrical clinics where a number of the uterine tumors complicating pregnancy may be discovered only in the course of a routine examination.

Seventy per cent of the 101 patients complained of pelvic pain, pelvic tenderness, or both, pain being the predominant symptom. This high percentage of pain as a symptom possibly does not obtain in the average number of pregnant women with these tumors. The majority gave a history of having missed one or more menstrual periods. Twenty-five per cent had too frequent or excessive menses, although only six gave bleeding as their chief complaint. At least 25 per cent had only recently known of the presence of the tumor. More than half (56 per cent) were thirty-five years of age and over; that is, in the decade of menstrual life when the ratio of pregnancies is diminishing and that of tumors increasing. Eighty per cent were thirty years and over. Nearly half of the group were primiparas.

The diagnosis of uterine fibromyoma coexisting with pregnancy is often extremely difficult and sometimes impossible. Spencer says that it is easier to overlook the pregnancy than the tumor, particularly in the first half of pregnancy when the usual signs of discoloration and softening of the vaginal mucosa and cervix, softening of the body of the uterus, uterine contraction and ballottement may be absent, or if present may, with the exception of uterine contraction, result from a tumor and not from pregnancy. During the second half of pregnancy, continued cessation of the menses in the presence of a rapidly enlarging tumor is of the utmost importance. During this time, fetal movements may be felt, and the fetal heart may be heard.

*Read before the Southern Minnesota Medical Society, Mankato, Minnesota, December 4, 5, 1922.

A softened fibroid undergoing degeneration may simulate the uterine softening of pregnancy and fibrous nodules may be mistaken for fetal parts. Moreover, this condition must be differentiated from abnormal pregnancies such as tubal, cornual and twin pregnancies, and from pregnancy in the presence of ovarian tumors, or other tumors of the pelvis and lower abdomen.

Careful history-taking is of great value and will usually indicate that there have been one or more missed periods, and furthermore that the enlargement of the tumor has been rapid and comparatively recent. Even in the absence of other signs of pregnancy, rapid growth of a uterine myoma should always place the physician on guard. When there is doubt as to the diagnosis, a waiting policy should be adopted unless the patient's symptoms demand interference, which will not be often. A lapse of several months may demonstrate the presence or absence of definite signs of pregnancy.

One must be prepared to meet the psychical effect that delay causes: the patient may be annoyed at the delay and uncertainty in the diagnosis and, not infrequently, may be so insistent that she is not pregnant that a waiting policy is difficult to follow.

Occasionally the history may be so obscure, the physical findings so indeterminate and the patient's complaint so serious, that an exploratory laparotomy may be necessary to clear up the diagnosis.

The complications which may arise can be divided into two groups, the effects of pregnancy on uterine fibromyomas, and the effects of uterine fibromyomas on pregnancy. An intrauterine pregnancy is the occasion for changes in uterine fibromyomas even though no unusual symptoms arise. Almost invariably there is increase in size and softening of the tumor. Opitz reports two cases of a lessening of the size of the tumor, but this is extremely unusual. The tumor may become impacted in the pelvis because of its size or because of adhesions preventing the enlarging uterus from rising out of the pelvis. Torsion of a pedunculated tumor is an occasional complication and infection of the tumor may occur, more particularly in the puerperium.

A condition which deserves special mention is the so-called red degeneration, characterized by an aseptic necrosis with hemorrhages into the tumor, giving it a red appearance on section, which is prone to occur in these tumors during pregnancy. Schiller, who has described the condition admirably, says that its cause is not definitely known. Several of the theories are that it is produced by infection, by the toxins of pregnancy, by thrombosis of the blood vessels, or by endarteritis. It is known that the interstitial tumors are more apt to show this change than are the submucous or subserous tumors, and that one or more nodules may show it while others in the same uterus do not. This is explained on a basis of the lessening of the blood supply to the tumor due to the contraction of the uterine muscles which causes rotation of the tumor. This rotation frees the tumor from the surrounding uterine muscle, and leaves it in a space in which the blood supply may be relatively poor or inadequate. Most of the myomectomies are performed on account of symptoms arising from this condition. These may vary from a mild malaise, with tenderness and discomfort, to severe attacks of pain and shock, and sometimes peritonitis.

The effects of these tumors on pregnancy are shown mainly by an increase in the tendency toward certain complications such as placenta previa, hemorrhages occurring from implantation of the placenta over a submucous tumor or from the submucous tumor itself, abortion, premature labor, dystocia due to abnormal presentation, to uterine inertia or to the location of the tumor in the lower uterine segment and postpartum hemorrhage due to retention of the placenta or from a submucous tumor.

In advising treatment, there are three main considerations: the present welfare and future health of the mother, and the welfare of the child. There are two general lines of treatment: non-operative or expectant, and operative. Many women with uterine fibromyomas who become pregnant will pass through pregnancy and confinement without symptoms due to the tumor. The treatment will be expectant, depending on the location, size and condition of the tumor, and the symptoms which may arise. Expectant treatment carries with it certain risks: abortion, red degeneration of the tumor, hemorrhage, incarceration of the uterus and tumor in the pelvis, malposition and malformation of the fetus and dystocia. Sloughing of a fibromyoma during the puerperium, causing peritonitis, has been reported by Kosmak and others. Tumors in position to obstruct at the time of labor, those so

TABLE 1. METHODS OF TREATMENT AND RESULTS

		Miscarriages							
	Number	Number	Per cent	Therapeutic abortion elsewhere	Premature labor	Labor at term	Living child	Death of mother	Not heard from
Expectant treatment	66	16	24	..	9	41	35	..	..
Abdominal exploration	3	1	33	..	1	1	1	..	..
*Myomectomy	15	5	28	1	..	6	4	..	2
Porro-cesarean	7	..	..	..	..	..	4	1	..
Cesarean section	4	..	..	..	..	..	2	..	..

large that their presence gives marked pain and discomfort, and those which are causing pain and tenderness, or hemorrhage, may necessitate surgical intervention. Myomectomy and cesarean section, with or without hysterectomy, are the two most universally accepted types of operation, the choice depending on the period of gestation and the nature of the complication which has arisen as a result of the tumor.

Myomectomy has been recommended as a conservative operation in cases in which the fetus has not reached the period of viability and in which surgical relief is urgent because of symptoms, or on account of the tumor obstructing the passage. W. J. Mayo has reported successful myomectomies which have averted threatened abortion in several instances. Polak, Robertson, Kosmak, and others, also advocate this operation. On the other hand, Spencer and MacFarlane consider that it is rarely necessary and is not infrequently followed by miscarriage. Bottsford estimates that abortion or premature labor follows myomectomy in 17 to 20 per cent of cases, the incidence of interruption of pregnancy being higher if the gestation is more than six months. According to Williams, this is not a higher incidence than ordinarily obtains in pregnancies.

Hysterectomy before reasonable viability is contraindicated except in cases of acute degeneration or incarceration of the tumor, or severe uterine hemorrhage, if myomectomy cannot be performed. Hysterectomies for uterine fibromyomas have been performed, and when the uterus was opened, an early unsuspected pregnancy was found. Spencer makes the statement that he has never found it necessary to perform a hysterectomy, and Tuffier prefers the classical cesarean with myomectomy at term.

Cesarean section, with or without hysterectomy, is without question the operation of choice in those patients who can go to term with reasonable safety, and who cannot be delivered by the vaginal route. Heinach asserts that therapeutic abortion, as a means of relief, is illogical as it is not curative. Polak says that it is a difficult problem and there is no more dangerous procedure.

Sixty-six of the 101 patients in the series were treated expectantly. Ten had cesarean sections at or near term. Twenty-four patients, on three of whom an abdominal-pelvic exploration was made, had operations prior to the period of viability. One of these patients, on whom a myomectomy was performed, had a vaginal cesarean elsewhere at term.

Of the group of sixty-nine patients, including those treated expectantly and those having explorations, seventeen had miscarriages, ten had premature labor, and forty-two had labor at term with thirty-six living children. This shows a slight increase above the normal incidence of miscarriages and a decrease in the number of living children. Following delivery, seventeen of these patients had operations for the removal of the tumor. Twenty-five of the remaining fifty-two reported that they were well, but some had symptoms attributed to the tumors, and twelve among those reëxamined were advised that removal of the tumor was not necessary. Four have died, one following hysterectomy for the tumor and three from other conditions. One patient returned five years after confinement with an inoperable carcinoma of the cervix.

There were fifteen myomectomies in the group; in this number were five miscarriages in the hospital following operation, one therapeutic abortion per-

TABLE 2. POSTPARTUM RESULTS IN SIXTY-NINE PATIENTS NOT OPERATED ON BEFORE CONFINEMENT

		Living				Dead	
Patients	Number	Well	Fair	Poor	State of health not known	Illness	Operation
Operated on	17	4	1	..	9	2	1
Not operated on, operation not necessary	12	8	1	..	3	..	..
Exact condition of tumor not known	40	17	10	6	6	1	..

*During this period, January, 1910, to January, 1922, there were 4,684 hysterectomies for benign uterine tumors and 741 myomectomies on non-pregnant uteri.

formed after the patient left the Clinic, one vaginal cesarean and six normal labors. Two of these patients were not heard from. There were no deaths in the group. Of the three patients on whom explorations were performed, one had a miscarriage, one gave birth prematurely and one a full-term birth.

There were seven hysterectomies with one death. These cases are divided into three groups. The three patients in the first group had symptoms of fetal death or incomplete abortion; they were forty years of age. Two had marked metrorrhagia and the third, general malaise and a weighty sensation in the pelvis. At operation, besides the tumor, a macerated fetus was found; the shortest gestation was six weeks and the longest, about sixteen weeks. In the second group, pregnancy was suspected from the appearance of the uterus after the abdomen was opened, but hysterectomy was necessary on account of large multiple tumors with evidence of degeneration and necrosis involving almost the entire uterus. The two patients were each forty-three years of age. One had been married twenty-three years, and had had no pregnancies except two induced miscarriages early in married life; the other had been married twenty years, without known pregnancy. Gestation had proceeded four months in the first patient and between two and three months in the second. In the third group were two patients in whom pregnancy was not recognized until myomas were removed from the uterus. These patients were thirty-five and thirty-six years of age respectively. The first patient said that she had had a normal menstrual period three weeks before the operation, and the second patient gave a history of a missed period two months before operation with a slight daily show for three weeks before. Each had multiple uterine fibromyomas, one containing a four weeks' and the other an eight weeks' fetus.

Of the eleven cesarean operations, eight were performed in the Clinic, seven of them being Porro-cesareans. Three cesarean sections were performed elsewhere, two on patients who were treated expectantly up to the full period of gestation and the third, a vaginal cesarean, on a patient on whom a myomectomy had been performed in the Clinic at the third month of gestation.

CONCLUSIONS

Most patients with fibromyoma of the uterus pass through the period of pregnancy and confinement without alarming symptoms and may be treated expectantly.

A careful history of the menstrual flow, making a special note of the exact date and description of the last menstrual period, is of the utmost diagnostic importance in the examination of patients with fibromyoma of the uterus, especially when the tumor is rapidly enlarging.

When there is the least doubt concerning the possibility of pregnancy, several weeks or months, if necessary, should be allowed to elapse before a diagnosis is made, unless the symptoms of the patient are such that delay is dangerous.

Operations for fibromyomas of the uterus, associated with pregnancy, are sometimes necessary before the period of viability. These may be abdominal exploration or myomectomy. Exploration of this type of tumor might be made more freely; myomectomy is definitely indicated at times and the incidence of miscarriages following myomectomy are not unduly high, but hysterectomy before the period of viability is rarely indicated and should be resorted to only when the patient has developed alarming symptoms. It has not been necessary to advise hysterectomy prior to the period of viability in any case in which a diagnosis of fibromyoma complicating pregnancy with a living fetus was established.

The operation of election in those cases in which operation is indicated is that of Porro-cesarean or cesarean section at term.

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DISCUSSION

DR. W. H. CONDIT, Minneapolis, Minnesota: Dr. Mussey is to be complimented on his excellent presentation of this subject and so fortunate to have such a wealth of material to study. Figures never lie, so we must concede that in this state seven thousand pregnancies were complicated by myomata during the past year. In the year 1921 there were 55,000 births in this state and undoubtedly in 1922 there will be at least 56,000.

This is a very timely paper and so well presented, with such a large number of cases to draw conclusions from, that I feel I can add very little from our small group. I wish to emphasize two or three points; one is that this is one of the complications of pregnancy that is staring us in the face in our attempts to decrease the mortality of childbirth. You know that we have not succeeded in lowering the mortality of childbirth in this state or in the United States in the past twenty years; we are fourteenth in the group of nations in the statistical reports of fatalities from complications of pregnancy. I hope in some of our meetings soon we will have a symposium on obstetrics. It is a vital question with us today. Now how are we going to do this, and how are we going to know how many of these myomata contributed to fatal issue in pregnancy? It is surprising to know how many myomata you will find of different size, some probably absolutely symptomless and which never will produce symptoms, immediately after delivery with the patient under anesthesia and absolutely relaxed when one can feel every part of that uterus. We know in one out of every eight white women we will find a myoma of greater or less extent. How much these contribute to postpartum hemorrhage, we do not know. The placenta may be implanted over a submucous one, or an intramural one and after delivery it may contribute to a postpartum hemorrhage. We have had difficulty only occasionally in diagnosing a pregnancy, differentiating between that and the rapidly growing soft myoma. We have a patient in the hospital now who has been under our observation for four years for sterility and she had a large myoma that made the uterus the size of a four months' pregnancy. Last August she was told she was pregnant and was threatening miscarriage. She had had repeated bleeding, metrorrhagia rather than menorrhagia. She had had fairly normal regular periods but would have intermenstrual hemorrhages. She finally became rather anemic and it became imperative to remove the tumor. We had hoped to do a myomectomy but felt that it was impossible to save enough of the uterus to permit a pregnancy and that it would be dangerous for her to become pregnant afterwards. The error was made at the time of the hemorrhage in August because of a typical history of pregnancy. She had missed one period, with a scanty one before that, but it was evident from the condition of the uterus that this was impossible. There was not enough endometrium nor enough room in the uterus to have a conception. Another point is, we have had three in the last year on which we performed myomectomy—one at five months, one at six and another at about four and one-half—all have gone to full term with uncomplicated delivery. At the same time we were on the alert. We instruct them to give us plenty of time and as soon as labor begins to go into the hospital, fearing that we might have to do a cesarean because of the possibility of rupture of the uterus. I think the chances for rupture of a myomectomy scar are probably greater than from a previous cesarean section scar.

The other points of importance I think the doctor has brought out very clearly but there is no question but what these myomata go unrecognized in many cases where they could be operated during pregnancy, and especially the pedunculated ones that cause incarceration and failure of the uterus to rise, in that way contributing to miscarriage. They are very easily removed. It is remarkable even how large a one you can remove and get a good scar and the patient go on to uncomplicated full term delivery.

FOREIGN BODIES OF UNUSUAL INTEREST REMOVED FROM THE AIR PASSAGES

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Case 1 (A408580). Mr. C. O. N., aged forty-two years, came to the Clinic October 23, 1922, complaining of coughing and expectoration of ten years' duration. He said that his trouble had begun with an ordinary "cold", contracted as a result of change in climate. He had coughed constantly, and had raised an abundance of foul, purulent sputum, particularly during the winter months. One year before, he became definitely worse. He was confined to his bed for two weeks, during which time his temperature reached 102. He is now of the opinion that he had pneumonia. Following this attack the patient raised as much as one quart of sputum in twenty-four hours. The sputum was frequently tinged with blood. August, 1922, an ounce of

bright red blood was raised. Several examinations of the sputum did not reveal tuberculosis bacilli. The patient was quite well nourished. Dyspnea was markedly present on exertion. Physical examination of the chest showed evidences of extensive disease in the lower lobe of the right lung. Examination of the blood revealed a hemoglobin of 80 per cent; the erythrocytes numbered 4,710,000, and the leukocytes 14,000. A roentgengraphic examination of the chest revealed a foreign body in the right bronchus at the level of the ninth rib posteriorly (Figs. 1 and 2).

The patient was again questioned with regard to the onset of his illness, and it developed that just previous to the onset of symptoms, while he was having some dental work done, a crown that was being fitted disappeared rather mysteriously. The dentist had insisted that the patient had swallowed it, but the patient had felt certain that this was not the case. He had had no cough or discomfort at the time of the accident. The following day a "gurgling" noise occurred in his throat on respiration, and several days later he contracted the so-called "cold."

October 28, the patient was bronchoscoped under local anesthesia, and a large dental crown removed from the right descending bronchus (Fig. 3). The patient was dismissed and allowed to return home October 30.

Fig. 3. Dental crown.

Case 2 (A381798). Mrs. C. W. S., aged forty-two years, came to the Clinic January 15, 1922, with a fragment of a dental plate lodged in her bronchus. She had aspirated the fragment while laughing three days before. The plate had been broken for several weeks, but since the nearest dentist was fifty miles distant and the patient was able to chew her food with the pieces of plate fitted together, it had not been repaired. The foreign body caused frequent paroxysms of coughing. Roentgen-

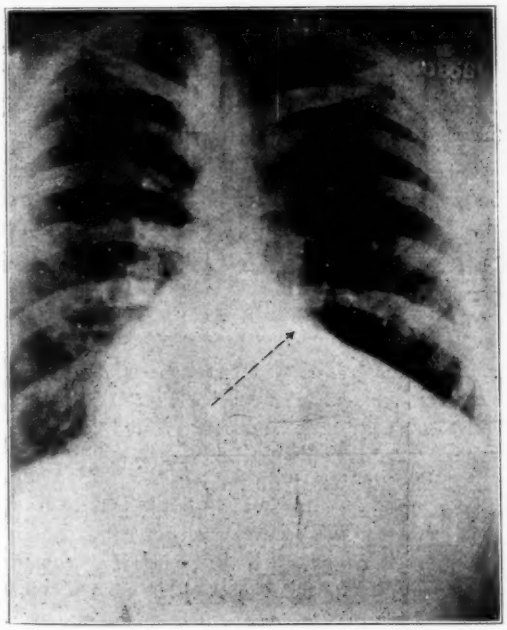

Fig. 1 (A408580). Anteroposterior view of foreign body in the right bronchus.

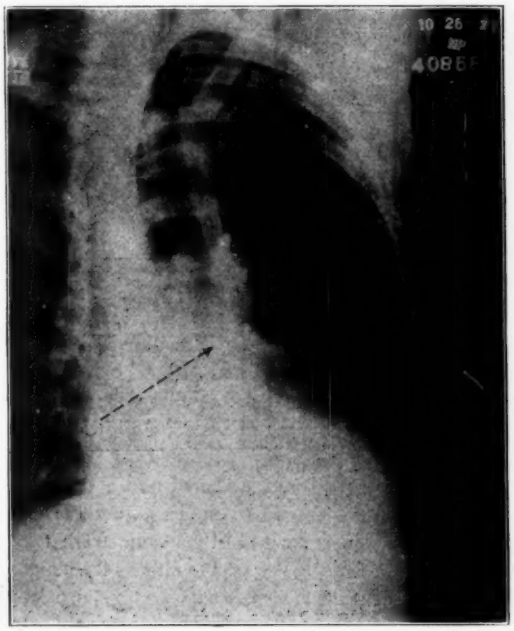

Fig. 2 (A408580). Oblique view of foreign body in the right bronchus.

ographic examination made at her home, the day after the accident, revealed the fragment in the right bronchus (Fig. 4), and she was immediately sent to the Clinic for treatment. She was greatly exhausted when she arrived, from the continuous coughing and dyspnea.

The patient was sent to the operating room and bronchoscoped under light ether anesthesia. The lower third of the trachea was greatly inflamed and edematous. The dental plate (Fig. 5), which was wedged firmly in the right main bronchus, was removed without trouble. Three days later the patient was dismissed from observation with only a slight bronchitis.

Case 3 (A63882). Mr. S. S. B., aged sixty-nine years, came to the Clinic April 6, 1922, complaining

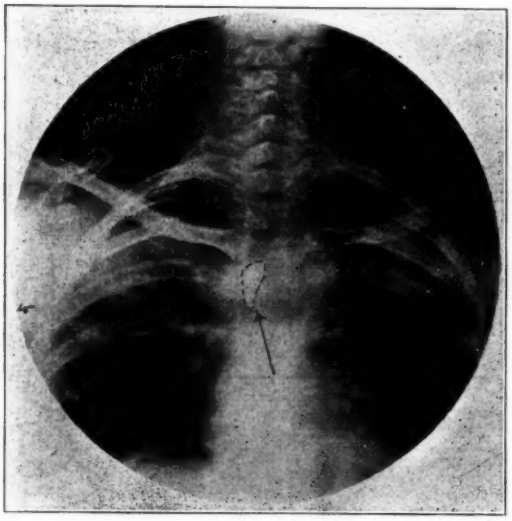

Fig. 4. Dental plate in the trachea.

of chills, fever, and cough. His trouble had begun December 1, 1921, when he had had a choking spell while taking chicken soup. At that time he had coughed up a small piece of bone. Following this he had had chills and fever at intervals of from five or six days to two weeks, and had had a constant harsh cough accompanied by moderate mucoid expectoration. The fever would continue from two to three days. During the febrile attacks the cough and amount of sputum increased.

Physical examination of the chest showed marked emphysema with râles throughout both lungs.

Fig. 5. Portion of dental plate.

Roentgenographic examination of the chest showed nothing abnormal. April 24, 1922, the patient was bronchoscoped under ether anesthesia, and nothing of particular significance was noted except a small pale mass about 3 mm. in diameter, on the anterior wall of the right descending bronchus. This small tumor was removed and found to be a granuloma containing several tiny pieces of bone (Fig. 6).

Since the operation the patient has continued to have a slight cough. No chills, and practically no fever have been noted. His weight has increased twelve pounds, and he is quite well in every way.

CONCLUSIONS

Case 1 is of interest in that it shows how a foreign body may pass into the air passages without producing evidence of strangulation and may remain there, unrecognized, for many years.

Case 2 illustrates the fact that a large foreign body may enter the trachea.

Case 3 demonstrates how a very small foreign body in the air passages may give rise to marked general symptoms.

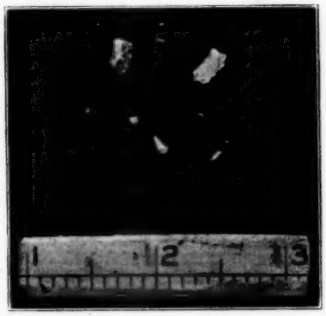

Fig. 6. Pieces of chicken bone.

HELIOTHERAPY IN INFECTIOUS DISEASES OF THE BONES AND JOINTS*

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Rollier, of Leysin, Switzerland, began in 1903 to use the sun as a therapeutic agent. This, of course, was not the first time heliotherapy had been used, as the subject of "sun treatment" and "sun cure" has appeared and reappeared in medical literature during all times of history.

To Rollier belongs the credit, however, of having assembled scientific data existing up to that date and having applied them on a large scale clinically. Ten years later, he published at the International Physio-therapeutic Congress the results of heliotherapy in a large number of cases of bone and joint tuberculosis showing results that up to that time might have been called miraculous.

Ever since the publication of the above paper in 1913, I have used heliotherapy as an adjunct in the treatment of bone and joint tuberculosis. I have also used it in the treatment of a number of other chronic bone and joint infections.

Rollier's work was done in the mountains of Switzerland where the curative sun rays are unobstructed by the denser atmospheres of lower sea levels. In addition, he was able to expose his patients practically all the year round. While it is no doubt true that we who live in Minnesota have not the same ideal conditions to cope with, it is, nevertheless, a fact that we should acquaint ourselves more fully with the sun's curative properties. Many patients, who today are lying under roofs, who are covered with blankets and whose discharging wounds are covered with dressings, would be much better off if roof, blankets and dressings were removed. I venture to predict that in the next decade we will see the elevators in most of our hospitals extended upward another story, so that patients can be brought directly to the roof, where arrangements will have been made to receive and care for them according to modern heliotherapeutics during those months when our Minnesota climate permits it.

While Rollier's work was done chiefly in an institution and while it is true that institutional care is the ideal treatment, it is again, nevertheless, a fact that heliotherapy can be made use of by the patient at his home. Institutions will never take care of more than a small fraction of the cases which can be benefited by sunlight. All of us must needs acquaint ourselves with this therapeutic agent of proven value so that we may be able to instruct the patient and his surroundings in the home treatment by sunlight.

Exposure of the entire body surface to the rays of the sun is always desirable and gives the best results; nevertheless for practical reasons, this often is impossible. The local exposure of an arm, or leg, or other affected portion of the body is also of great value to the patient and is not to be decried as valueless or useless.

Since 1913, I have sent many of my patients to the northern part of the state during the summer months, with instructions to "live in a bathing suit." The patient who is undergoing the sun treatment is, of course, also getting the additional advantages of rest and fresh air. There is no doubt that it is the rays of the sun which are the greatest factor in achieving curative results. In my work, I have followed as much as possible the directions of Rollier as published in his 1913 paper.

For several years, I worked during the winter months with the mercury vapor quartz lamp (this was some five or six years ago). At that time, I was unable to note much change in the sense of improvement in a number of my cases, and my interest in the mercury vapor quartz lamp abated. It may very well be that my technic in using it was faulty. During the past few years, favorable reports are again being published regarding the use of the above mentioned lamp, and I shall again take up its use.

In this climate, it would, of course, be of great value to have some substitute for sunlight. Whether this substitute is to be found in the roentgen ray, or radium, or whether it will be the above mentioned mercury quartz lamp, remains to be seen. It is probable that an absolutely satisfactory substitute for the sun ray will never be devised. To judge from recent literature, the mercury vapor quartz lamp offers the best substitute to date.

To those of us who are interested in heliotherapy the work done at the Glen Lake Sanatorium (which is for Hennepin county tuberculosis patients) is both stimulating and instructive. I call your attention specifically to this institution as it is close at hand, as the work being done there is of the most modern type, and as the reception you will get there will be

*Presented before the annual meeting of the Minnesota State Medical Association, Minneapolis, October, 1922.

the most cordial. I advise you to go and see.

One must be somewhat careful in the application of sunlight and not rush matters too much in the beginning. The point is to achieve a *tan* and not a *burn.* Blondes do not tan as readily as brunettes and in blondes one must be more careful in the gradual application of sunlight. I have been in the habit of slowly exposing the entire body, beginning with the upper and lower extremities, first with short exposures and gradually lengthening the time of exposure, on every succeeding day, exposing increased amount of skin area, so that after two or three weeks, the entire body is finally irradiated. One must be careful to protect the patient's eyes and head from the rays of the sun. No exposure should take place soon after meals.

It will be found that the older the patient, the easier he or she will become tired. One should be careful to guard against exhaustion and increase of temperature. The fact that the patient had a temperature before beginning heliotherapy is no reason for not using this method. However, a distinct rise of temperature following irradiation is usually a sign that exposure has been too long. Draughts should be avoided and the patient should be kept out of the wind. In my work, I have followed these rules both for general exposure, as well as in local exposure.

Most of my patients take their sun treatments at home and I must say that, given a patient of fair intelligence, this method offers remarkable possibilities. The degree of attention which the patient has paid to his treatment is registered by the amount of tanning present, and, as a rule, the degree of improvement in tuberculous and non-tuberculous infections can also almost be measured by the same degree of tanning.

In the winter months and on days when the sun does not shine, a quartz lamp promises to be a fairly satisfactory substitute. It is to be recommended. The types of cases here reported have been treated by sunlight exclusively. While glass windows destroy the larger number of curative rays, and while it is the desire and aim to expose the patient to the direct, unobstructed rays of the sun, I believe improvement will be noted even in those cases where it is impossible to put the patient out of doors and where the rays of the sun pass through the window.

TUBERCULOSIS

Tuberculosis of the bones and joints, of course, presents the largest field for the use of this therapeutic agent. It may be said that the treatment of bone and joint tuberculosis has been revolutionized by Rollier and his followers. Orthopedic appliances from now on must be more or less removable, so that the rays of the sun can reach the patient's skin, especially over the affected regions. More extension and rest must be used than heretofore.

In children, the method can be easily used when an intelligent mother is in attendance. In adults, the element of time often enters, and it is probable that operations, such as resection of joints, will always retain their practicability.

The application of sunlight to these tuberculous patients immediately increases the appetite and a gain in weight is noted. Within a few weeks, freedom from pain and a general condition of well-being and cheerfulness has established itself. The patient becomes accustomed to his new environment and sleeps and feels well. Fistulæ usually close, sometimes with surprising rapidity. Deformities often disappear; especially in the young. I have been able to watch, for instance, the disappearance of quite marked kyphosis in Pott's disease. Simple orthopedic measures are, of course, necessary—in addition to the sunlight—such as extension of a flexed hip in hip-disease, or extension in a flexed knee. The foot-drop in ankle tuberculosis must always be guarded against.

While it was my opinion up to a fairly recent time that a stiff, ankylosed joint, in good position, was the best result that a patient could obtain in tuberculosis, I have been led to believe that by means of heliotherapy, tuberculous joints may frequently "heal out" with painless motion. It is, of course, difficult to tell when complete healing has taken place. We may speak of cure in a tuberculous joint when the joint is painless and is strong enough to perform its function in a satisfactory manner, no matter whether it be ankylotic or movable.

OSTEOMYELITIS

I have been in the habit for the past six or eight years of exposing my postoperative, osteomyelitic cases to the sunlight, and it is surprising with what rapidity long incisions, designed to lay bare long stretches of bone, will granulate and heal. It is, of course, necessary to treat these cases, first, according to surgical methods. Occasionally the application of sunlight per se will result in the extrusion of a large sequestrum.

Case Report. A boy aged seven with chronic osteomyelitis of tibia, dating one year. A large sequestrum was pres-

ent. It was necessary to open the tibia widely in order to remove what was previously practically the entire shaft of the tibia. Enough involucrum had formed so that a new tibia had established itself. The incision reached from the knee to the ankle. There was considerable pus. There was no attempt at suturing. This boy was instructed to expose his leg all day to the rays of the sun beginning, of course, in a gradual manner. Two months later, the wound (which was at least 12 inches long and 2 inches wide) had absolutely healed.

I believe that in all forms of chronic suppuration, healing can be hastened in most cases by a matter of weeks and even months, if sun rays were applied.

CHRONIC ARTHRITIS

It is here that I found heliotherapy of great value in a number of cases. This is at best a distressing condition to deal with. The patients who nowadays arrive at my office suffering with chronic arthritis, come sans teeth, sans tonsils, and often minus a few other organs. (It is, of course, necessary in these cases to remove all possible foci of infection when present.) Each case must, of course, be studied for itself. A number of these cases are due to focal infection; another group are probably due to some gastro-intestinal disturbance, while I believe a third group has a neurological basis. The application of sunlight in my work has, in these cases, been more or less empirical.

Patients suffering from chronic arthritis are willing to grasp at a straw. Sunlight is cheap and not harmful. It is usually easily available and can be easily applied. I believe we should use it in chronic arthritis. For the sake of brevity, I wish to report only two cases:

Case 1. A woman 56 years of age who had suffered from typical, chronic arthritis for about 10 years. The wrist and fingers were swollen and partly ankylotic. Her elbows were partly ankylotic and the knees swollen and partly ankylotic. The ankles were swollen and stiff and there were deformities of toes. The patient had been in bed for the past two years. The tonsils and teeth had, of course, been removed a long time ago. After four months of energetic heliotherapy, during which time the patient's skin was thoroughly tanned, this woman was again able to get up and about so that she could walk around the house and even get up and down stairs. Her joints remained swollen but pain and tenderness to a great degree left. Up to now (three years later), the patient has materially improved; she is up and about and does her own housework.

Case 2. A woman 50 years old. The diagnosis was monarticular chronic arthritis of the right knee. *X*-rays reveal no focal infection of teeth. The tonsils seemed normal, although they were removed. Her symptoms were pain, swelling and partial stiffness of the right knee with occasional effusion on over-use. The *x*-ray was negative. Here, we were dealing with a low-grade, non-tuberculous infectious process in the knee; type of infection being unascertainable. Three months' local heliotherapy (exposing the affected leg only to the rays of the sun), with only moderate rest to the knee, achieved a complete return to normal.

GONORRHEAL ARTHRITIS

After the acute stage of gonorrheal arthritis, I believe that the application of heliotherapy is followed by good results. I have used it in several cases, and I believe that the return to normal was at least hastened by its application.

Case Report. A young woman, aged 25, who had a typical gonorrheal-arthritis wrist which was non-suppurative. It was not necessary to open the wrist joint and it was protected by means of a cock-up splint and heliotherapy was instituted. As the hand and arm became tanned, it was surprising with what rapidity the joint effusion abated, and within about eight weeks the wrist could be considered normal, although somewhat tender for about two months longer, during which time heliotherapy was continued without use of the splint.

RICKETS

In addition to the usual anti-rachitic treatment, we have, in heliotherapy, a valuable adjunct in the treatment of this disease. I am in the habit of placing all of my rachitic children in the sunlight, and believe that the child's nutrition and general well-being are materially improved thereby. Of course, such orthopedic measures as are necessary to correct the deformities are indicated at the proper time.

"FLU" INFECTIONS

Immediately following the "flu," I have noted a number of swollen joints, as well as painful feet, that could probably be directly attributed to the same infectious agent as that of influenza. It has been my experience when such a low-grade microorganism enters the tissues as, for instance, the sole of a foot, or a joint, that it causes a chronic and painful condition of the affected region characterized by more or less swelling, effusion, tenderness, pain and local heat, and especially characterized by its great chronicity. In this type of case, I believe we have in the application of sunlight a valuable adjunct in hastening cure.

It is necessary to add the usual orthopedic appliance needed to support the foot in these cases. While it is, of course, difficult to prove, I believe that we have succeeded in shortening the convalescence of many of the cases of infectious weak foot by the strenuous application of sun rays to the lower extremities for hours at a time.

CIRCULATORY DISTURBANCE OF THE FEET

Some time ago (August, 1921), I published a paper on this condition in which heliotherapy was advised. I believe that in cases of circulatory foot disturbance the patient can be improved by the use of heliotherapy.

In conclusion, it may be said:

1. That there are a number of other chronic infections, besides tuberculosis, which are advantageously affected by the rays of the sun when properly used.
2. There exist few dangers in the application of heliotherapy.
3. Heliotherapy can be used in the home as well as in the institution; it is, of course, preferable in the institution.
4. I believe the time has come for us to see to it that our hospitals use their roofs and porches and surrounding grounds for the application of heliotherapy.

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DISCUSSION

DR. J. H. BENDES, Oak Terrace, Minnesota: In dealing with heliotherapy there are two important things to take into consideration, one of which is, that heliotherapy is not a panacea for all ills, and secondly that it does not mean turning patients out into the sun indiscriminately and having the sun's rays play on them, and expect them to get well. Heliotherapy, properly applied, first in postoperative treatment for chronic infectious diseases, as gonorrheal arthritis, rickets and surgical tuberculosis, is an agent that stands alone.

Dr. Geist referred to the value of heliotherapy, as given in the mountains of Leysin by Rollier. It can be given not only in a mountainous climate, but on the plains as well, and in the city on hospital roofs. It is unnecessary to live in mountainous regions to apply heliotherapy.

Here in Minnesota we have given heliotherapy as late as the last week in November and the first part of December, starting as early as the first of March. Two years ago, at Glen Lake Sanatorium, we started the latter part of February, and had good sunshine three or four hours a day during the time we gave it.

Many patients, who lie in hospitals, covered up with blankets, if turned out into the sun, would get well. At Glen Lake Sanatorium, at the present time, we have a case of osteomyelitis of the humerus. The boy was operated upon some time during the winter for osteomyelitis. What was done I do not know, but from the history of the case I should judge that the bone was scraped, the wound sewed up and the boy sent home. This boy, 15 years of age, came to the Sanatorium in April. He had ankylosis of the elbow, swelling and pain. All we did, was to give him the benefit of sunlight, apply traction to the arm, and he now has a straight arm, free from pain, and good motion. The same thing can be applied in the hospital as well as in a Sanatorium.

In chronic arthritis and rickets, and especially in cases of gonorrheal arthritis, a patient usually goes to the surgeon, because he has a lot of pain and deformity, but principally on account of pain, and the surgeon operates without benefit, but when heliotherapy is applied it is surprising how that pain is relieved. The patient knows there has been something done for him.

In applying heliotherapy to postoperative cases, a great many patients are benefited by it. Time and again, cases present themselves, in which wounds would not heal, and these patients have been steadily losing ground, but under the influence of heliotherapy a different picture is presented. The wound starts healing, the patient improves, and in fact in almost hopeless cases the patients get well.

DR. ARNOLD SCHWYZER, St. Paul: The subject of heliotherapy is a very interesting and important one, and I shall take the liberty of saying a few words regarding it.

Heliotherapy gave results to Rollier that we had thought impossible before. This was followed by some experimental work to try to find out what was really done. It is known that we have in the skin an organ that is more important than we have previously thought. A short time ago a great dermatologist in Germany stated that the function of the skin should be put on a par with the organs of internal secretion. In early childhood scarlet fever, measles, smallpox, or at any time erysipelas are localized in the skin, and these acute infections are taken care of. All this immunization is going on principally in the skin.

Outside of tuberculosis, they have had in Leysin very good results with osteomyelitis cases, also with infantile paralysis cases as to their general condition. From Leysin are reported results in various other conditions, even in pseudoleukemia. This is particularly true of one such case of pseudoleukemia. The man was so much improved that he became a mountain climber and bicycle rider. He then left Leysin, went down into the low land and worked in a factory. His condition became worse; but after returning to Leysin in the mountains for one year he was again on his feet. He is still living, it being seven years since treatment by heliotherapy was undertaken.

It was found that the insolation of the skin for half an hour increases so much the circulation in the skin that seven times more blood goes through the skin after insolation than before. This effect does not stop suddenly with the insolation, but continues for another two hours. This shows we have a most important effect. Furthermore, all the cases that come to high altitude and are exposed to the sun have a decided increase in the number of blood corpuscles and an increase of the hemoglobin.

MINNESOTA MEDICINE

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EDITORIAL

The Social Worker—The Modern Moses

Presently we have in St. Louis county a movement to unify all social and relief work under one board of commissioners, headed by a "director." The agitation has arisen from the very plausible source—a "Taxpayers' League"—whose watchword is "Efficiency and Economy"—the greatest possible use of the tax dollar.

No one need wonder that every taxpayer's ear is delicately attuned to this wave length, and he welcomes this message out of the air, regardless of the conflicting whistling tones that may accompany and confuse the message. In other words, the plan brings into bold relief the clash that is inevitable between the outspoken social worker and the doctor, when it comes to the oversight of endeavor that we hold to be chiefly medical.

For example, the bill planned would abolish our Sanatorium Commission, the Poor Board and the Work Farm Board. The first, dealing with a tuberculosis sanatorium, is certainly in large part a problem of medical care and hospitalization; the second has for one of its chief duties the medical care and hospitalization of the poor, the aged and infirm—the great indigent class; the last has a good deal of medical interest in the care of the drunkard, the criminal and the "ne're-do-well." In the place of these various voluntary boards would come a salaried director, with four assistants (all social workers, presumably), governed or supervised by a political body of seven or nine appointed by the county commissioners. Out of this hodge-podge is supposed to come the economy promise!

Our Board of Regents of the University is a voluntary body; likewise, the State Board of Health and the Advisory Commission for Tuberculosis. The executive agent sponsoring and developing this bill declares, before numerous organizations, that, "The tendency of the times is to abolish voluntary boards and commissions, and put in their place efficiency experts and directors . . ."

The gentleman is quite correct in this, as anyone can see when we consider that Russia presently is in the hands of two directors, one with brains and the other with a bayonet. Presumably, if the man with the brains could handle the bayonet, only one would be necessary. Indeed, an echo comes from our legislative halls which would seem to indicate that there are many with us who think the Board of Regents should be abolished!

All of this is not an editorial effort to direct the attention of the membership of the Minnesota State Medical Society to certain local issues, even though they vitally concern St. Louis county. Rather is it intended to draw the attention of all our membership to the vital need of keeping up our interest in a variety of movements that cannot succeed without us. Do we wish the control and direction of our tuberculosis sanatoria to be handed over to laymen, to make of them stereotyped and soulless communities, with a statistical instead of a therapeutic atmosphere? What are we to say of medical inspection carried on in our schools, not under the direction of doctors, but under men who are a combination of statisticians and playground supervisors?

It is time that we were fully awake to these decisive issues, and each, by looking into his own community affairs, can see where our work lies. Our new Health Journal comes at a time when it focuses our attention upon these matters. Let us

wake up, or long before we have state medicine a large segment of medical practice will be dominated, directed and controlled by laymen, whose growing pride in profession and desire to perpetuate their kind, and to likewise justify their existence, will relegate us to the inoffensive rôle of *helpers*. It is from their ranks that they look to find the modern Moses who will lead turbulent and sick humanity into the "Promised Land"!

E. L. T.

Medical Publications

The following remarks are admittedly destructive in nature. We know of no solution of the problem of medical publications at large. That there is an inexcusably large mass of medical matter—good, bad and indifferent—being published today, all will admit. The impossibility of reading all that appears even in a more or less limited sphere is admitted by every physician.

When we consider the numerous state journals, national weekly, the journals devoted to the specialties, systems, text-books, new and revised, published in this country alone we must admit that the profession is suffering from a mental dyspepsia due to overfeeding. The result in most instances is that we read the American Medical Association journal, the State journal perchance and two or three other publications at best or in despair read nothing at all.

One of the disadvantages of such an array of publications is the difficulty in finding information on any special subject. Much is admittedly rehash and duplication and very little is actually original; and much of the original work does not stand the test of time. We are inclined to be faddists, as a profession, largely because it is easier to follow the leader than to make the effort to cerebrate. The experienced properly evaluates any innovation even though sponsored by a recognized leader but too often a published article is given undue reverence so commonly accorded the printed word, to the detriment of medical practice.

For this reason subjects presented at medical meetings should not be published indiscriminately but should be carefully judged before they are put in print. While editors may disclaim responsibility for ideas expressed in original articles (so-called), a responsibility exists and should be assumed by some one. Editorial comment is of value but obviously impossible in all cases. Printed discussions of published papers, therefore, serve an important function. Nor should such discussions be entirely extemporaneous but one or two at least should be pre-arranged and carefully prepared by some one especially qualified by experience in the particular subject to give an unbiased opinion.

The Tower of Babel

A recent contributor to the National Geographic Magazine discussed the jangle of tongues that operate in all Europe and east of Russia, insulating these varied peoples from each other. The only tongue that retains its continuity steadfastly with neither a nationalistic background nor a patriotic literature, is that of the Nomad Gypsies. All the others during the past century instead of merging for common advantage have been the keener differentiated by the development of modern printing and the demand that the "national" tongue be used in court and schools. Rumania, formerly with a free and logical use of French, is stated to have reverted to its cumbersome, less expressive inherited speech. Norway in the same way, instead of continuing the perfectly useful Danish, saw in the use of that language an intimation of previous servility and immediately cast it off, creating another racial barrier. The Irish and the Poles (always with much in common) have taken two different tongues and inflicted them upon their youth at a time when the growing mind in all countries finds quite enough to crush it to mediocrity by the extreme burden of a world curriculum that all must subscribe to. All of this obtained at a time when modern methods of transport and communication have made aloofness impossible, and unnatural boundary lines have become a menace to comfort and growth if not even to existence.

Fancy what it would mean if each of our states here, or provinces in Canada, had a rigid frontier and a language even more repelling than customs officials! Visualize the freedom of movement travelers, business representatives, not to mention "bootleggers," enjoy here in America and one can see the great handicap offered by the senseless tendency to further perpetuate a diversity of language chiefly in order to draw attention to a "glorious past"—a history valuable, interesting and productive; but nations must begin to prove their right to endur-

ance based not upon *what they were*, but *what they are*.

This is an introduction to the statement of a truth too little understood in medicine: No small country can have a medical literature of any significance because no publisher can afford to bring it out with such a limited number of prospective purchasers. This is doubly true of books but also includes magazines and current literature. The proof of it is seen in the fact that the German literature has been the medical pabulum for a host of other countries near and far: all the Scandinavian countries, including Finland; the Balkans; much of Russia (despite its great size); Japan; and likewise large portions of South America.

The French have likewise a liberal following, but we do not exaggerate when we state that English has come into an ascendency that is quite unquestioned.

Some enthusiasts saw this world linguistic problem a long time ago and attempted the impossible, calling it "Esperanto," but like the deaf woman who studied "lip reading," she found she could talk perfectly with her teacher and a few pupils but with no one else. So Esperanto, where learned, has simply furnished another puzzle to solve and created another memory inquisition. It is useless for us to assert that with England's aid our common language encircles the globe and should therefore become at least the world's medical language. The recent ascendency of the French will give them a new impetus to cast off everything that is outside their immediate influence—for this they will pay a very great penalty. The most extreme economic reduction of the Germans will not (for many decades at least) destroy their extremely virile literature. No medical library can possibly afford to be without it with its rich inheritance from the past and keen analytical production of the present.

Therefore we are left with the absolute need of perfecting ourselves (and our developing students) in the free use of the three great tongues rich in medical literature—English, French and German. Will all three survive? That is a hard question to answer. It is easier to say that no others will come up despite the blighting babble of dialects that is presently splitting the world up into senseless racial units. Certainly the English-speaking peoples have a well developed medical literature. We cannot ask the French and Germans to recede in our favor; we must in all reason coöperate with them and ask to go forward with them.

The problems involved must be keenly appreciated by every English medical publication, including this magazine. The character of the material presented must be equal to the heavy responsibility involved; it must aim to a far wider circulation than among our own people. To accomplish this will require the keenest and closest analysis of all of our offerings. It calls for a fuller and a better knowledge of the needs of countries to which we wish our literature introduced; it bespeaks for a world-wide, instead of a provincial point of view.

E. L. T.

MISCELLANEOUS

GORGAS MEMORIAL

The cornerstone of the Gorgas Memorial Institute of Research in Tropical Diseases and Preventive Medicine was laid at Panama on February 18, 1923, with impressive ceremonies and in the presence of an assembled concourse of people that included members of the American College of Surgeons from the Steamship Vandyck. President Porras of the Republic of Panama, following the rendering of the national anthem, delivered the following address:

LADIES AND GENTLEMEN:

I experience profound satisfaction from the fact that it is my privilege to lay the cornerstone of the Institute of Tropical Medicine which Panama dedicates to William Crawford Gorgas, to perpetuate his memory here, on the shores of the murmuring Pacific and in close proximity to that thoroughfare which—hurriedly in former days as though pursued by the phantom of death, and lingeringly today as though regretting the brevity of time which compels them to forego the delights of our benign and even climate, the beauty of our country's unchanging verdure and the incomparable blue of our sky—has been used by men of every nationality, for whom Gorgas cherished only sentiments of deep humanity which prevailed always over every prejudice of race, nationality, birth or class.

This sense of satisfaction that I experience now is derived primarily from the fact that I was a friend of this man whose memory we are today assembled here to tribute, and as such I was in an admirable position to fully judge the purity of his noble and good heart and further, being one of the old men of the days when he lived in our midst, I am better able, from experience, to appreciate more fully than the men of the younger generation, the great work of health, life and happiness which this great man accomplished for my country.

The monument which we will erect here will be an expression of Panama's gratitude to the man who proved beyond the peradventure of a doubt that the tropics could be made habitable for all the races of the earth. We are indebted to the genius of Gorgas for the transformation of

Panama from a fever-ridden land to the paradise we now live in and the benefits of health which engenders content, activity, clear-mindedness, energy and even valor. Therefore, we consider that Gorgas, to a certain extent, belongs to us also, because it was here that he saw his greatest effort to lighten the burden of a suffering humanity crowned with success.

It is the privilege of great men, sages, discoverers, heroes and martyrs, whose activities, teachings and examples are not circumscribed to the narrow confines of the land of their birth and whose achievements in the world have been beneficial to the majority if not to all their fellow-beings, to be universally loved. Such men—and Gorgas was one of them—cannot be citizens of one particular city, town or village; every city and every nation of the earth claims them; they are the real citizens of the world.

As in the case of Esculapius, when it was found necessary to enlist the services of an oracle to determine in which of the cities of ancient Greece which disputed this honor was his birthplace, and, as in the case of Christopher Columbus, who has been declared an Italian, a Spaniard and more recently a Jew, the birthplace of Gorgas, I am informed, is disputed, both Alabama and Georgia claiming this honor. However, Gorgas does not belong exclusively to the United States of North America where he was educated. Cuba and Serbia, Bulgaria and Ecuador, Panama and South Africa, all have claims to him as a result of his having lived and worked among them for the good of the human family.

The work accomplished in the world by the great Gorgas is immense, immeasurable. Of Hippocrates it may be said that he was the first to divorce medicine from witchcraft and the ecclesiastical mysticism of his times; of Galen, that he was a great physician and writer to whom is attributed the authorship of about 500 books intended to popularize the practice of medicine; of the great Pasteur, de Kock, Ramon Cajal y Cajal, Elhricj, Finley and Rose, that they penetrated far into the hidden secrets of the invisible, the infinitesimal world; of Metchnicoff that he evolved the famous Phagocyte theory and with Roux, Chamberland and Calmette, collaborated in and continued the work of the great Pasteur; but how can we describe Gorgas, who solved the apparently impossible problem of making the tropics habitable, thus complementing the marvelous work of God Who created us in order that we might live on this terrestrial globe and be happy on it? Gorgas destroyed the morasses of death and gave us pure drinking water and purified the air of our exuberant tropical forests and our colonial cities. Gorgas redeemed the tropics.

I can still remember, and it seems to me a horrible nightmare, the time, fifty years ago, when, on my way to Bogota to finish my studies, I found it indispensable to spend a night in Colon. Sleep during that night was impossible for me because of the constant and tormenting bites of the mosquitoes whose incessant buzzing smote on my ears as though they were the discordant notes of an infernal serenade. These minute tormentors were so numerous that by clutching at the apparently empty air I caught handful after handful of these tormenting pests. Neither can I forget conditions as they prevailed when I returned from college ten years later and entered the employ of the French Canal Company. From that time I was able to realize or at least suspect the underlying cause of the Frenchmen's failure in their attempt to construct the trans-Isthmian waterway. They constructed beautiful residences and tree-lined avenues and admirably organized their offices; but they did nothing, in fact they knew nothing, about tropical sanitation and apparently never suspected its worth.

In those days of long-ago, it was the most natural thing for one to promenade the city's thoroughfares holding a handkerchief to one's nostrils, to keep out or lessen the stench contaminating the air as a result of decaying vegetation, stagnant or putrid puddles and primitive or defective sewerage. On every hand one encountered well beloved friends hastening home in the grip of malarial chills or some other equally pernicious fever; or encountered on every street, people clothed in the somber black garb of mourning with the marks of grief and despair deeply impressed on their features; or daily heard the lugubrious tolling of church bells announcing the death of a friend or a relative; or was frequently summoned to attend the last rites to a departed friend laid low by the deadly miasmas of our unsanitated tropical homeland.

However, thanks to William Crawford Gorgas, these days have passed never to return and our tropical home has become one of the world's health resorts.

In the days of ancient Greece, shrines and temples were erected in the mountains and at the Springs of Health in honor of Esculapius, the God of Medicine. To these places of worship and thanksgiving an endless stream of sick and afflicted persons came to offer sacrifices and deposit votive tablets on his altars. And it is a temple such as these that we will erect here as a living testimonial to the memory of the man who brought so much comfort to the Isthmian family and the tropical world in general.

On this first stone, there will arise a great temple dedicated to this great man and to this shrine of Gorgas will come in a never ceasing pilgrimage, not only our sick compatriots but also the afflicted thousands from other points of the tropics to seek health with undying faith in the name of Gorgas. And they will depart hence for their distant homes, healed and happy, with tears of gratitude in their eyes and blessing our beloved country and the great and humane work of William Crawford Gorgas, the benefactor of humanity and the redeemer of the Tropical World.

THE STANDARDIZATION OF BIOLOGICAL STAINS

On March 2d. at the Chemists Club in New York City, there was held a meeting of the Executive Committee of the Commission on Standardization of Biological Stains. The members of this Committee are: H. J. Conn, Geneva; F. B. Mallory, Boston; L. W. Sharp, Ithaca, N. Y.; J. A. Ambler, Washington, D. C.; and S. I. Kornhauser, Louisville, Ky. The meeting was also attended by C. H. Herty to represent the Synthetic Organic Chemical Manufacturers Association, and by F. P. Garvan and W. F. Keohan to represent the Chemical Foundation. The meeting is a matter of interest to everyone in the medical profession.

All physicians realize the need of dyes for staining specimens in the laboratory diagnosis and investigation of dis-

ease. It is not perhaps so generally realized that the dyes used for this purpose, in order to give constant results, must be of very precise chemical composition; and yet it is a very difficult matter for either the chemist or the biologist to control their composition. Before the war all stains were imported from a single German firm. This firm did not manufacture stains, but bought textile dyes in batches of considerable size, and after some preliminary testing bottled them and sold them under its own name to the biological laboratories of the world.

When the war broke out the American laboratory was deprived of this foreign source of stains. After the pre-war stocks already on hand had given out, much difficulty was experienced in getting stains of the quality necessary. The Society of American Bacteriologists began an investigation of American-made dyes that were being sold as biological stains. The results of this investigation were so promising that it proved possible to secure the assistance of the National Research Council, through whose agency a co-operative investigation was arranged among the members of several national societies. Recently the work has been organized under a special commission independent of the Research Council but still representing the different national societies that were co-operating in the earlier work.

At the executive committee meeting of this Commission just held, the very encouraging results of the work were reported. It was shown that already the stains available in America are in practically all cases as good and sometimes better than the best of the pre-war stains. The most important fact brought out at this meeting was that while the pre-war stains were standardized only in an empirical way, by buying large batches without knowing the exact composition of the dye, they must now be standardized on the basis of pure chemicals.

The reason for this is because it is proving that in some cases the impurities present in the pre-war stains were very necessary. Sometimes these impurities were other dyes and sometimes supposedly inert materials like dextrin. In all such cases the task plainly before the Commission is to find out what the impurity is which was responsible for the good staining qualities of the impure product. Then in the future the users of stains must demand that these impurities be present, not as impurities, but as intentionally added ingredients. When this has been done and the products are labeled and used accordingly, the American stains will become standardized in a true sense of the term.

Very shortly the Commission will begin issuing certification of definite batches of stain that it has found satisfactory. These stains will be put on the market under a special label bearing the name of the Commission. Users of stains must be on the lookout for products bearing this label.

Buyers of stains must also watch for spurious imitations of this label put out by unreliable concerns. Any form of certification appearing on a stain label not bearing the name of the Commission is merely a certification by the manufacturer or dealer himself, and as such has no value.

The Chemical Foundation has very kindly agreed to support the work of the Commission financially.

AMERICAN RED CROSS

A special committee of the American Red Cross known as the Health Advisory Committee was appointed in October, 1922, to investigate and report on the question of its peace-time activities. Certain members of the medical profession have questioned at times these Red Cross activities. This committee composed of ten physicians who are experts in public health matters have, after a careful inquiry into the situation, unanimously expressed themselves in favor of the national society adopting a definite program of education in individual and public health matters. There has been a great variation in the character of the activities carried on by various chapters and a deplorable lack of uniformity in activities in general. The policies recommended include the organization of classes for the study of individual hygiene in the home and the general assistance of community health activities which naturally are the functions of the constituted public health authorities. Particular emphasis is laid on the desirability of obtaining the approval of the state, county or city health officers in contemplated health work. It is also recommended that chapters ask the local medical society to be represented on the executive committee of the chapter. Certain valuable suggestions are made with the idea of correcting certain abuses in conjunction with public health nursing.

The following quotation well expresses the spirit of the report:

"The primary incentive for undertaking a comprehensive Red Cross Health Program lies in the fact that the greatest present need in the field of public health is the need for educating the individual citizen and mobilizing popular support for the work of existing official and voluntary health agencies; and in the fact that the Red Cross through its Chapter organization is possessed of exactly the machinery best fitted for carrying out such tasks. Incidentally, however, we believe that the American Red Cross would itself be materially strengthened by the adoption of such a program. . . . If we can only show to the average citizen that the burden of preventable disease is indeed a menace to the prosperity of the state, as grave as the menace of a foreign foe, we shall find ready response. The Health Program outlined above gives to the Red Cross member the advantage of organized instruction in the art of living which will protect him and his family from danger; and it makes an inspiring appeal to him to give his services in the task of safeguarding the community as a whole against the evils which threaten it in the form of preventable disease."

WHY IS A COUNTY MEDICAL SOCIETY?

You certainly can spare two nights a month for improving your mind. Come to the meetings. Perhaps you can tell the others something that will help them. Help make these meetings lively, do your share. If you won't read a paper or report a case, get up and discuss the papers and cases that are presented.

If you can't improve your mind or won't share your knowledge with your neighbor, come to the meeting anyway. The seats are comfortable and no one will disturb your sleep.—*Denver Medical Bulletin.*

OBITUARY

DR. ASA WILDER DANIELS

Dr. Asa Wilder Daniels, one of the most prominent of Minnesota's pioneer physicians, died at his home in Pomona, California, Tuesday, February 27, 1923, following a sudden attack of acute bronchitis.

Dr. Daniels, who had attained the advanced age of 94 years, was born in Stafford, New Hampshire, on Jan. 15, 1829. His parents were Joseph S. and Roxana H. Daniels, who were pioneer settlers of northern New Hampshire. His father died when he was very young and his mother moved to Boston, where he was reared and educated.

After going to Boston Dr. Daniels secured an academic education at Lancaster and then studied medicine in the office of his uncle. He received his degree from the Boston Medical School, and on being graduated in June was united in marriage to Miss Emma Brown Evans of Philadelphia. Immediately after the wedding the young people came west to Minnesota, Dr. Daniels having secured an appointment as government surgeon at the Lower Sioux Agency near Redwood Falls.

Dr. Daniels and his bride reached St. Paul by steamer on July 4, 1853, now nearly seventy years ago, and after a brief stay in the territorial capital continued their journey to the agency. In the eight years that he worked among the Indians, Dr. Daniels had many interesting experiences, and the story of his career throws a flood of light upon western frontier life in those trying and romantic times.

To the young doctor fell the distinction of being the first man to administer chloroform in this section of Minnesota, if not in the territory.

For eight years Dr. Daniels was a government surgeon at the Redwood Agency, but in 1861 he resigned and began the practice of medicine in St. Peter. He conducted his practice under the most trying conditions. Inured to the hardships and the privations of the frontier, he spent many days and nights in the saddle, and often was known to ride forty miles or more in response to calls for his services. His experiences during these early years make the work of the modern doctor seem dull and commonplace.

A year after Dr. Daniels began his practice in St. Peter, in August, 1862, came the terrible Sioux outbreak. When word came that Little Crow and his warriors had attacked New Ulm, Dr. Daniels volunteered to accompany Judge Chas. E. Flandreau's expedition for the relief of the beleagured village. In the siege and battles that followed, the four surgeons with the defending forces—Dr. Daniels of St. Peter, Dr. Ayres and Dr. Mayo of Le Sueur, and Dr. Weschcke of New Ulm—rendered invaluable service. They established a temporary hospital, where they dressed the wounds of the injured and cared for them during the fighting.

When peace had been restored along the frontier, Dr. Daniels resumed the practice of his profession and followed it actively until 1900. In that year he bought a home at Pomona, but for five years more he continued to return to St. Peter during the summer months and receive his patients in the old way.

Dr. Daniels devoted himself earnestly to his life work. In 1866 he took a postgraduate course at the Ohio Medical college at Cincinnati and received a degree from that institution. Later he served for a number of years on the Minnesota State Board of Health. He was one of the founders of the Southern Minnesota Medical Society, which honored him and itself by making him a life member. He was the first physician to be elected to honorary membership in the Minnesota State Medical Association, in which he took an active interest. He was also a member of the American Medical Association.

He held a membership in the Minnesota Historical Society, and in the later years of his life he took a great deal of interest in its affairs. He was an active participant in some of the most stirring incidents of the early days, and his wonderfully retentive memory enabled him to accurately recall countless unpublished details of them. He is the author of a number of pamphlets which are regarded as very valuable contributions to Minnesota history. About two years ago, at the invitation of Dr. W. W. Folwell, he collaborated with the latter in the preparation of two chapters of Dr. Colwell's history of the state, probably the most pretentious work of its kind which has been attempted.

All his life Dr. Daniels interested himself in the affairs of the community, the state and the nation. He was a man of wide experience, and his broad information enabled

him to form accurate judgments, which he set forth with all the force of a vigorous personality. One reason for this sustained interest in current events, perhaps, was the fact that it was given to him to enjoy good health until his very last illness, his only physical infirmity being somewhat impaired hearing. At his home in California, he lived free from pain, enjoying good health, enjoying living and enjoying his friends. Of these latter he had literally thousands, and it is an impressive tribute to the worth of the man that, at the close of a long and active life, only good is spoken of him.

His home life was ideal. Mrs. Daniels preceded him in death in March, 1900, and of his seven children only three remain to mourn the death of their father. They are Mrs. John V. I. Dodd, of Pomona; Dr. J. W. Daniels and County Surveyor H. W. Daniels, of St. Peter. There are five grandchildren and five great grandchildren.

Dr. Daniels retained the use of his faculties until the end. The day he was taken ill, his son, Dr. J. W. Daniels, received a letter which was written on Feb. 20th. The author had written it on his typewriter, and it was drafted in the forceful characteristic style that marked all his communications. He closed it by saying: "All states have their advantages, but Minnesota is one of the best."

JULIUS PARKER SEDGWICK

The Faculty of the Medical School of the University of Minnesota records in sadness the addition of the name of Julius Parker Sedgwick to the lengthening roll of its honored dead.

The Faculty keenly feels the grievous loss his going means to the family and to the many friends by whom he has been greatly beloved, to the School he has ably and devotedly served, to the community he has honored by his clinical and social service, to the profession in which he has stood forth as a striking example of the modern type of the scientific physician and investigator.

Fallen all too early a victim to the ravages of disease, yet in his short span of time he has lived a life unusually full, he has given himself generously to the good of his fellows, to the uplift of medical education, to the pursuit of research, to the welfare of infancy and childhood in his own country, as he did to the betterment of the children of France in the Great War.

His name is written into the literature of medicine, but it is also written in the hearts of many mothers and in the lives of many of the men and women of the future whose early years he has tended and whose imperilled health he has restored.

The Master of Men "took a little child and set it in the midst of them." It was His symbol of service to humanity and it serves anew as the symbol of the life and the love of our Friend of the Children who has gone out and gone on.

His associates of the Faculty desire to express to his family their affectionate sympathy and the assurance that his memory will be cherished in the history of the School.

DR. MILTON A. TROW

Dr. Milton A. Trow, 70 years old, one of the oldest practicing physicians in the state, died suddenly at his home in Chatfield, March 16, 1923, of heart disease. Dr. Trow had been a physician forty-five years, most of that time practicing in Chatfield. Of late years he had partly retired.

Dr. Trow is survived by a sister in the east.

DR. C. E. DAMPIER

Dr. C. E. Dampier, of Crookston, councilor of the first district of the Minnesota State Medical Association, died at the Bethesda hospital in Crookston, Tuesday, February 20, 1923, at the age of 68 years. Death was due to pneumonia.

DR. JOSEPH McCUSKER

Dr. Joseph McCusker, of Glenwood City, Wisconsin, died at his home February 3, 1923, at the age of 31 years, following an acute attack of pneumonia.

Dr. McCusker is survived by his mother, Mrs. Sarah McCusker, by one brother, Dr. Charles McCusker, with whom he was associated in the practice of medicine, and one sister, Miss Margaret McCusker. He was a former resident of Litchfield, Minn., and a graduate of the high school. He received his medical education at Marquette University. Dr. McCusker was a very lovable man and his early death is greatly deplored.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNEAPOLIS CLINIC WEEK

The annual Clinic Week in Minneapolis is scheduled for April 17th to 20th. This meeting will immediately follow that of the sectional meeting of the American College of Surgeons which will be held at the Hotel Radisson, Minneapolis, April 16th, making it possible for visiting physicians to attend both meetings.

Clinic Week headquarters will be at the Hotel Radisson. Clinics will be given each morning by Minneapolis physicians at the different hospitals, where attempts will be made to demonstrate cases in every field of both medicine and surgery. Each afternoon from 3:30 to 5:30 meetings will be held at the Hotel Radisson. Demonstrations of clinical cases and clinical specimens will probably displace the addresses and symposia of former years. It is impossible at this time to secure even a tentative program of the afternoon meetings but cases of encephalitis lethargica will probably be shown. The treatment of diabetes with insulin will also be explained and cases thus treated will be demonstrated.

Arrangements are being made for the entertainment of visiting ladies.

Dr. John R. Murlin, of the University of Rochester, N. Y., is to give the address at the annual meeting of the Hennepin County Medical Society to be held during Minneapolis Clinic Week, April 16th to 21st. The subject of Dr. Murlin's address is "PANCREATIC EXTRACTS IN THE TREATMENT OF DIABETES."

An invitation is extended to all members of the State Medical Association to attend this banquet on the evening of April 17th, the exact time and place of which will be announced later.

AMERICAN COLLEGE OF SURGEONS, SECTIONAL MEETING

The sectional meeting of the American College of Surgeons will convene in Minneapolis Monday, April 16, 1923. Headquarters will be at the Hotel Radisson.

The first meeting will be held at 2:00 P. M. in the Gold Room, where addresses will be given on subjects related to hospital management. A round table conference will follow this part of the program.

Special invitations have been sent from Chicago to hospital superintendents, boards of directors and other hospital officials to attend. The public is also invited and it is expected that physicians will attend in large numbers.

Fellows of the American College will meet at 4:30 P. M. for a business session to elect state executives for next year. The work of the college, its organization in detail and its various departments will be outlined by Allen Craig, associate director of the American College of Surgeons. The address will be illustrated by lantern slides. Members are urged to attend and physicians not members are invited.

The community Public Health meeting will be held at 8:00 P. M., which is part of the effort the college is making to assist in the great movement for better health. Addresses will be made by visiting members which promise to be short, snappy and interesting to the general public.

THE A. M. A. MEETING IN SAN FRANCISCO

Arrangements for the American Medical Association meeting, which will be held in San Francisco, June 25 to 29, 1923, are rapidly advancing to a state of completion through the activity of the local Committee of Arrangements, of which Dr. W. E. Musgrave, San Francisco, is chairman.

The American Medical Association is fortunate in that all of its section meetings, the scientific exhibit and the commercial exhibits and registration bureau, as well as the meetings of the House of Delegates, will be under one roof at San Francisco. The Exposition Building is a magnificent building, well adapted for the purpose of the Association. San Francisco is abundantly supplied with good hotels and there need be no fear that good accommodations for all who will attend the meeting may not be had.

Many social, sight-seeing trips and tours are being arranged to suit the convenience of visiting Fellows and their friends. Monday and Tuesday, June 25 and 26, will be given over to a series of nearly one hundred Diagnostic Clinics. These will be given in the accredited hospitals of San Francisco and Oakland by both visiting and California Fellows and will cover a variety of subjects. Monday and Tuesday, July 2 and 3, post-convention Diagnostic Clinics will be held in different places in the state, under the auspices of one of the forty-one county medical societies or hospitals accredited by the Council on Medical Education and Hospitals of the A. M. A.

Arrangements have been completed for an Official Special Train, Chicago to San Francisco, to accommodate members attending the convention. The Special Train will leave the Chicago Passenger Terminal, Chicago and Northwestern Railway, at 11:30 P. M., Thursday, June 21. This train will arrive at 3:00 P. M., June 22, in Omaha, where it will be possible for Minnesota physicians to join the party. The schedule has been carefully arranged so that practically all the scenic points of interest, including Denver, Colorado Springs, Pueblo, the famous Royal Gorge, Salt Lake City, the canyon of the Feather River and California's capital, Sacramento, will be passed during the daytime. The train will arrive in San Francisco at 5:45 P. M. Monday, June 25. For the benefit of those who will be unable to leave on the Official Special Train, June 21, or who desire to reach San Francisco via the shortest and most direct route, arrangements have been made for special sleeping cars on the "San Francisco Overland Limited" leaving the Chicago Passenger Terminal, Chicago & Northwestern Railway, 8:10 P. M. Friday, June 22, and arriving in San Francisco, 2:30 P. M. Monday, June 25. The second schedule lists the train as leaving the Union Pacific station in Omaha at 9:45 A. M., June 23. Those desiring to take advantage of traveling on the Official Special Train should communicate with Mr. H. G. Van Winkle, General Agent, C. & N. W. Ry., 148 South Clark Street, Chicago.

NORTHERN MINNESOTA MEDICAL ASSOCIATION

The annual meeting of the Northern Minnesota Medical Association to be held June 4, 5, and 6, 1923, in Alexandria, promises to be most interesting according to the plans outlined by the program committee, of which Dr. W. L. Burnap, Fergus Falls, is chairman.

The scientific program will be largely clinical and includes the following in the list of participants: Dr. Willard Bartlett, vice president of the American Medical Association, St. Louis, Mo.; Drs. A. J. Ochner, A. A. Goldsmith, Paul B. Magnuson, Chicago; Dr. J. V. I. Brown, Milwaukee; Drs. R. D. Carman and H. E. Robertson, Rochester; Drs. Charles Lyman Greene, George K. Hagaman, C. N. Hensel, Saint Paul; Drs. Frank Bissell, F. C. Rodda, Max Seham, H. E. Michelson, Minneapolis; Dr. Olin W. Rowe, Duluth.

Special musical programs, golf and tennis tournaments, automobile excurisons, dancing parties Monday and Tuesday evening, and fishing are listed as the various forms of entertainment planned for guests at the convention. Sinclair Lewis, the novelist, brother of Dr. C. B. Lewis, who is president of the association, will speak before the association Monday evening, June 4.

OF GENERAL INTEREST

Dr. Haldor Sneve, of Saint Paul, is planning to move to Redlands, California.

Dr. and Mrs. L. L. Hardt are the parents of a baby daughter, born February 28.

Dr. Ramsey, of Tasmania, who is in this country on a clinical trip, is visiting the Mayo Clinic.

Dr. and Mrs. J. G. Saam, Eveleth, are now in Chicago, where Dr. Saam is continuing his practice.

Dr. and Mrs. J. R. Sturre, of Eden Valley, are the parents of a son, born Tuesday, February 20.

Dr. A. C. Matthews, formerly of Napa, California, has located at Becker for the practice of his profession.

Dr. Thomas Arneson, who formerly practiced medicine at Audubon and Twin Valley, has located at Hitterdal.

Dr. A. E. Benjamin and Dr. Irving C. McDonald, both of Minneapolis, have returned from a two weeks' sojourn in Florida.

Dr. Julius Johnson has returned to his practice in Minneapolis following the completion of a postgraduate course at Harvard University.

Dr. John W. Bell, of Minneapolis, has returned to active practice from the south, where he spent several weeks following a long illness.

Word has been received of the death of Mrs. W. H. Gaugh, wife of Dr. W. H. Gaugh, Granada, which occurred Wednesday, March 7, 1923.

Dr. R. T. Glyer has disposed of his medical practice at Brooten and has left for California, where he and Mrs. Glyer will make their home.

Dr. H. F. Helmholz, of Rochester, recently spoke before the Jackson County Medical Society, Kansas City, Mo., on the subject of "Pyelitis in Infancy and Childhood."

D. Hugo Branyan, of Wabasha, left the latter part of March for Waukegan, Illinois, where he will be associated in the practice of medicine and surgery with Dr. C. E. Ambrose.

Dr. and Mrs. W. J. Mayo, of Rochester, have returned from a three weeks' cruise on the Mississippi. They were accompanied by Dr. and Mrs. D. C. Balfour and Mr. and Mrs. J. H. Kahler.

Dr. C. E. Proshek, of Jordan, has resigned his position as house physician and surgeon at Mudbaden Sanitarium and is now in Chicago, where he will take six months' postgraduate work.

Dr. Burton Rosenholtz has resumed his practice at 611 Lowry Bldg., Saint Paul. Dr. Rosenholtz recently returned from Europe, where he spent some time in the further study of diseases of children.

Word has been received that Dr. McDougald, of Le Sueur, who was reported ill with typhoid in New York, where he is doing postgraduate work, has fully recovered and is again able to attend to his studies.

Dr. Robert L. Wiseman, president of the Chisago-Pine County Medical Society, has returned to his home in Pine City following an operation which he underwent at St. Luke's Hospital in Saint Paul last month.

Dr. Hazel D. Bonness, of the Minnesota State Board of Health, recently accepted appointment as chief of the child welfare division of the Montana State Board of Health, Helena, Montana. She will succeed Dr. J. J. Sippy.

Professor Leon Asher, Head of the Department of Physiology of the University of Berne, and Director of the Physiological Institute of Berne, Switzerland, gave a series of Mayo Foundation lectures February 27 and 28 and March 1.

The new Shriners' Hospital, located on the River Boulevard on the boundary line between Saint Paul and Minneapolis, was formally opened in March under a staff of Twin City orthopedic surgeons, Dr. Wallace Cole, of Saint Paul, being the chief surgeon.

Dr. John M. Conroy, of Nopeming Sanatorium, has resigned and assumed his new duties as resident physician of the Tri-County Pure Air Sanatorium at Salmo, Wisconsin, March 16. Dr. Conroy will succeed Dr. M. S. Homer, of Ashland, who recently resigned.

Announcement has been made of the marriage of Miss Helen Thompson, of Minneapolis, to Dr. William B. McMultrie, of Marble, which occurred at the home of the bride's parents, February 6. Dr. McMultrie was graduated from the school of medicine at the University of Minnesota in June.

The officers of the Women's Auxiliary of the Minnesota State Medical Association are desirous of obtaining the names of the wives of members of the State Medical Association. Married members are urgently requested to send in their wives' names and addresses to Mrs. Rood Taylor, Secretary, 4222 Harriet Avenue, Minneapolis, Minn.

Dr. C. A. Hedblom, of Rochester, recently returned from High Point, N. C., where he read a paper before the Tri-State Medical Association. Dr. Hedblom also addressed the Ingham County Medical Society, Lansing, Michigan, and attended the meeting of the Northeastern Indiana Academy of Medicine at Kendallville, Indiana, en route home.

Dr. C. H. Mayo, Rochester, sailed March 26 on the Aquitania for Europe accompanied by Mrs. Mayo and their daughter, Miss Edith. Dr. Mayo plans to present a paper prepared in conjunction with Dr. H. S. Plummer on "The Function of the Thyroid Glands and the Lowering of Mortality in Surgery of the Thyroid," at the Swiss goiter conference in Basil in April. Dr. Mayo expects to return on the Aquitania May 12, arriving in New York, May 20.

The Eyesight Conservation Council of America is anxious to bring to the attention of school authorities and school physicians the desirability of instituting Eyesight Conservation Days in the schools throughout the country. It is recommended that such days be designated annually or semi-annually preferably at the beginning of each school year and that the day be set aside for testing vision of the pupils by school physician or teacher. Those detected with defects of vision may be given cards to be taken home to parent or guardian with the recommendation that the child's eyes be examined by an oculist. In this way the many children who are handicapped by poor vision can be detected and fitted to glasses. Those interested should communicate with the General Director, Times Building, Broadway and Forty-second Street, New York City.

TRANSACTIONS OF THE MINNEAPOLIS SURGICAL SOCIETY

STATED MEETING HELD NOVEMBER 12TH, 1922
THE PRESIDENT, DR. R. C. WEBB, IN THE CHAIR

COMPOUND, COMMINUTED FRACTURE OF THE LOWER THIRD OF THE TIBIA AND A SIMPLE FRACTURE OF THE UPPER THIRD OF THE FIBULA

Dr. S. R. Maxeiner presented a male patient, aged 40, who was admitted to the General Hospital October 10th, 1922, with the following history of injury:

On October 5th in trying to jump and kick in his house he caught his left foot, tripped and fell. A doctor was called who said the leg was broken and a cast was applied. The skin was not broken at that time. Because of the cast being uncomfortable he removed it himself and found the cotton next to the leg bloody.

On examination of the leg October 10th, there was seen a discolored dark area about 10 cm. in diameter over the lower part of the tibia, about two-thirds of the way from the knee to the ankle. In the middle of this area was a sinus opening through which there was a small amount of seropurulent discharge. There were several vesicles about this area. *X*-rays showed a compound, comminuted fracture of the lower third of the tibia and a simple fracture of the upper third of the fibula. He had a temperature of 104 and his pulse was 82. Hot saline packs were applied for two days and the leg placed in a pillow splint. His leucocyte count was 11,500. He was markedly irrational at night. On the 12th he was extremely irrational but his white count fell from 11,500 to 9,000 and the leg seemed to improve. He gradually regained his rational state of mind and a neurological consultation was requested and they agreed with us that the delirium was not the result of the fracture and his mental condition, temperature and leucocytosis did not indicate an infection severe enough to account for his irrationability. He had a compound, comminuted fracture which was infected, but at the same time the delirium was from another source (due to moonshine). Because we could not control him and the fact that the leg needed extension, on October 14th we put a Steinman pin through the heel and suspended a fifteen pound weight from the foot. He then went through his delirium and came to himself in a few days. *X*-ray after application of the extension shows a good position of the fracture. *X*-ray after removal of the pin shows the bones of the leg in fairly good position and the formation of callus and deposit of calcium.

FIBROSARCOMATA OF THE HAND

A second case, presented by Dr. S. R. Maxeiner, was a man, fifty-three years of age. This patient, a carpenter, was working for some time this Fall as a harvester and threshing man. On October 31st, 1922, he was admitted to the General Hospital. His complaint was that a tumor had been developing in the palm of his left hand for about eight weeks. The first he noticed was a callus and some swelling and he had pain in the hand at times. He lifted off the callus a couple of times and got considerable relief. The mass grew steadily larger and was painful, particularly in using the hand and holding a pitch fork.

The growth in the palm of the left hand was centered just proximal to the metacarpophalangeal joint of the middle finger. There was an elevation of the tissue measuring 3.5 cm. transversely and 2.5 cm. horizontally. The mass was firm in consistency and not easily movable under the skin. The tendon of the middle finger was tense and prominent proximal to the mass. There was some numbness of the middle finger.

Laboratory reports of the urine and Wassermann were negative.

Before the patient was admitted to the hospital a scalpel was introduced into the hand and the suspected fluid did not evacuate. Then he came to the hospital and today (Nov. 2nd) under local anesthesia the tumor was removed for diagnosis. Grossly it presented somewhat the appearance of tuberculous glands in a bunch and showed more than one nodule to it and these apparently were encapsulated. On dividing one of these nodules it was found that the growth was very firm, having the pearly gray appearance of a sarcoma, and on microscopic examination proved to be a fibrosarcoma. Dr. Bell of the Department of Pathology saw the specimen today and reported the diagnosis as a sarcoma of the less malignant type—a fibrosarcoma. He does not advise amputation but to remove all of the tissues more widely from the hand in the region of the wound, which will be done at once.

X-rays show the tumor visible in anteroposterior and lateral views involving the soft parts only. The outline of the tumor can be seen very plainly especially in the anteroposterior view. There is no involvement of bony tissue.

Dr. R. C. Webb in referring to the first case said that the Steinman pin, which, however, should be called Codivilla pin, occasionally sets up a low grade osteomyelitis resulting in a chronic sinus after extension is removed.

Dr. A. A. Zierold stated he recalled having a case at the University Hospital a year ago somewhat like the second case of Dr. Maxeiner. The mass was just below the lateral condyle of the humerus and the question arose whether there was a cystic or tuberculous process present. It was incised and the tumor tissue was very similar to what Dr. Maxeiner describes. He attempted to denude the bone without invading the joint. It was not a complete removal. Dr. James Johnson has seen the case more recently and reoperated. This will give some idea of the time of recurrence in sarcomata of this type.

Dr. James A. Johnson said the case that Dr. Zierold referred to with fibrosarcoma of the arm was one of their students at the Medical School. He had a recurrence at the site of the original tumor in less than a year. He therefore made a wide excision, including the capsule of the radial joint, also a large portion of muscle around the growth. After this excision 50 milligrams of radium was placed in the wound to make certain of a complete destruction of all the tumor tissue. Not infrequently fibrosarcomata occur after injury. Dr. Johnson recalled four cases that

he removed from fingers at the University Dispensary. These were all secondary to incision injuries to the fingers. Two of these cases had a local recurrence and had to be reoperated.

Dr. Arthur F. Bratrud mentioned another case of a similar growth to that of Dr. Maxeiner. Dr. Robertson examined the tissue and made a diagnosis of angiosarcoma, stating that mitosis was marked. Different surgeons did not agree as to what was most advisable. However, all agreed that amputation should be performed at any point from the wrist to the shoulder. Dr. Robertson's opinion as to whether this was granulation tissue or a malignant condition could be questioned. Upon his advice wide local excision was performed. This was on November 7th, 1920, and to date there is no sign of extension or recurrence.

SEVERAL PROPOSITIONS, BOTH GENERAL AND SPECIAL, FOR THE CONSIDERATION AND CARE OF CLEFT LIP AND PALATE

Dr. Harry P. Ritchie gave an exceedingly interesting talk with lantern slide demonstrations on the above title. He said:

"I have written of and discussed this subject several times and I fear that I have little new upon it, although each time at the opportunity for talking I find that I meet with a great deal of interest. In my experience this is a subject that is not only of a special nature but must interest everyone. I feel the need of consultation with orthopedic men, surely with the medical men and also with nose and throat men, and particularly of the pediatricians.

We used to feel that this subject interested only a very few and yet I find operations being done by oral surgeons, nose and throat men and those working in several associated fields; so I have almost decided that it is everything except a surgical problem.

In the study of this condition I have come to the conclusion that our procedures must be founded upon general surgical principles and that there must be a review of the whole subject in order to clear up many very greatly debated problems which have been discussed in the literature and I believe add confusion to the proper procedures.

The recent publication of the article by Dr. John Staige Davis and myself in the Journal of the American Medical Association, deals with a part of the subject that has not been discussed in the literature and yet which seems to me to be the most important thing. This article has the purpose of developing a rational terminology. It also purports to make a classification for the case as a whole whatever the anatomical combination is and affords the opportunity for an exact record of the original condition. These are the things that those of us that are interested particularly in the subject must agree upon in order that we may definitely understand each other in our discussions of the proper technique for the repair of a given case.

My criticism has been that the tendency of the literature has been towards a routine treatment for every case, which seems to me would be an impossible thing because we have such a multiplicity and variety of anatomical combinations. By this reason it would seem impossible to develop a routine surgical repair which would meet all situations, no matter what the disposition of the tissue. If we are to advance in the consideration and care of these cases it must be along the lines of selected measures and the determination of those results to any given case, and therefore it is of the greatest importance that we have the exact original record of the case. Whether our program as now published is to meet this or is to be substituted by something better, it is nevertheless, as I have said before, the most important feature of our work in the repair of this deformity.

Over the many years of the literature there has accumulated such a mass of technical details—choice of sutures, angles of incisions and reposition of tissue—that one is absolutely lost in the selection of them in a given case, so that our effort and study must be along the lines of selection of the many methods which will fit in with our ideas of general surgical principles.

The question of "time of operation" is a very important one and we must have some reasonable basis to make a statement. For about 100 years we have been talking about the complete palate and I believe that it is necessary to separate this complete palate and indicate the different structures of which it is composed and bring out the fact that it is the cleft of the alveolar process that is the principal thing in our selection of time of operation. If the process is normally closed in a new baby and there is a lip cleft present, we can do that case with equal facility at any time that we may select. The operation on the lip requires the mobilization of tissues which are elastic and movable and the time element is in no way important. If the baby is born with a normal process and a cleft palate, then according to our present ideas operation should not be attempted until the baby is well established for the reason that operation upon the palate carries with it a risk of greater blood loss, more surgical shock and more danger of post-operative complications especially respiratory in nature. It is not a wise procedure to attempt an operation of either the soft or hard palate until the baby is surely able to stand a very considerable degree of traumatism, so that now we will suggest that this cleft be repaired when the baby is a year old or fourteen months old, even later if there is a reason why it should be postponed. But if the baby is born with a cleft in the alveolar process, then it is necessary, as we have proven again and again, that this cleft in the alveolar process be repaired as early as possible compatible with the condition of the child and at any rate before the baby is three months old. We have here in the closure of the cleft of the alveolar process a surgical proposition which is not present in the repair of any of the other clefts. Here are bones separated which must be moved to close that cleft. If done early these bones are soft and pliable and will yield to pressure oftentimes of very little degree and the operations when undertaken at this stage are universally successful whatever method of closure we may use, whether by the use of wires or by closure of the lip first. But if the operation on these structures is delayed beyond three months, the bone becomes fixed and set, and when closure is attempted it is accomplished with very great difficulty owing to the fact that the bones have lost their pliability. This leads to a conclusion that is the most important statement upon this feature of time of operation; if the baby is born with a normal

process, no matter what the deformity in front or back, we can take our time and consult our convenience, but if the process is cleft, then the baby must be attended to and something done to close the process at the earliest possible moment. The lip cleft and the palate cleft which are usually associated with the cleft alveolar process then can be operated at any time the judgment of the operator sees fit.

In the literature there is a debate as to the sequence of operation, whether the palate or the lip shall be done first. If "palate first" means the raising up of the mucoperiosteal flaps of the hard palate and approximation of the tissues of the soft palate, then I directly and positively object. If "palate first" means "process first," then I emphatically say yes, because no wide cleft of the process will permit a satisfactory repair of the lip or closure of palate. In the study of the tissues I believe that both procedures, lip first or process first, are perfectly proper and that the selection of the procedure is materially influenced by the degree of the process cleft and the age of the baby, and that is one of the reasons that we are trying in our classification to make actual measurements of the case and record it in its original condition to see if it is possible to work out some schemes which may have a general application in the selection of procedure between these two plans. I am continually seeing the process closed by doing the lip first. I have also seen clefts of such a degree that it would be absurd from a surgical and technical standpoint to expect closure of that process cleft by doing a lip first, all of which leads to a more intimate study of the whole subject which presents so many interesting problems."

Dr. S. R. Maxeiner in discussing Dr. Ritchie's talk said:

"I do not think Dr. Ritchie's paper should pass without some sort of a discussion. I know that most of us feel that we are not capable of doing so. I have been to Chicago and watched Dr. Brophy work and it is very wonderful to watch a man of his age do the delicate work he does with such beautiful results. Dr. Brophy I believe reports the highest number of cleft palate operations on babies under six months with no mortality.—I think something like 211 cases—and Dr. Brophy still uses chloroform anesthesia. He is, I believe, deserving of a great deal more credit than is given him in the texts. I reviewed the work of Blair in which he only mentioned the work of Brophy. When in London I visited Lane and Berry and I never saw two men more opposed to one another. Each seems to think the other is all wrong. They are absolutely open in their discussions of one another, probably due to the fact that they both are in the same city and thrown together. I saw some of Berry's cases and his results are very beautiful. One thing I was impressed with and that was that Berry did not seem to be discouraged because he happened to get a hole in the palate after the first closure. If we got some of the holes Dr. Berry closed later we were very much discouraged about it. Major Mullally with whom I served in France was a protege of Lane and a very ardent supporter. They had Brophy in London and asked him to do his famous wiring operation but the baby died and that discouraged the wire operation.

"Unquestionably we must select the proper procedure, as Dr. Ritchie says, for each case. Why should we use the same technique for cleft palates of different types or lips of different types?"

WHERE WE ARE WRONG

In every fad and cult that holds the public imagination for a time, there is at least a spark of truth—if only a psychologic one—to keep the flames of credulity alive. In the pseudomedical sects, no less than elsewhere, is this so; and it is by the disregard of this fundamental principle that the profession paves the way for chicane's advance.

To every physician there comes at times the patient who presents a definite set of symptoms that are unaccounted for by any pathological lesion, a case which is not an actual medical or surgical one—or truly neurological, either. When the average doctor meets these cases, he dismisses them with a "nothing wrong"—and the disgruntled patient goes away, to become a follower of one or another of the antimedical bodies, *and there to find relief.*

Why should not the qualified medical man handle these cases? Why not extract the grain of truth or psychologic fact that accounts for the seeming success of fad cures, and apply it himself, in combination with his scientific knowledge? It is true that there is no harm in having a patient with no actual lesion treated by the irregular cults. But once he finds a seeming cure there for his purely symptomatic illness, he takes his real and serious maladies to the same healers—and there the danger for him lies.

Every patient who leaves a doctor dissatisfied, with his symptoms unrelieved, and then finds a cure outside the profession, strengthens the insidious hold of the cults; and it is only because of our failure to appreciate the psychologic factors that the quacks and faddists grasp that we fail where they succeed.

Needless to say, we are not recommending the mulcting of healthy patients by unnecessary treatment; but we do believe that a keener psychologic appreciation would help the particular patient who finds his cure with the "irregulars," and undermine the cult. It is our own fault, among others, if charlatanry exists.—*New York Medical Week.*

A UNIQUE REMINDER

Blessed is the man who has an inventive turn of mind and thrice blessed is he when he uses it to the advantage of his fellows. Occasionally a secretary of a county medical society develops a novel idea and applies it for increasing and for holding the interest of its members in the work of the society. Dr. Frederick A. Baker, Secretary of the Oakland (Michigan) County Medical Society, has the program for each of six meetings printed on an ordinary red shipping tag, provided with a string for tieing the tag to the telephone in the office of each society member. None but an extremely unobservant man can fail to be reminded many times in each day that he is a member of his county society when a red tag bearing witness to that effect hangs glaringly from his telephone. No member of the Oakland County Medical Society is ever without an easily reached source of information as to what the program for the next meeting is to be. Dr. Baker's tag reminder is unique and the idea is worth trying out by county secretaries generally.—*A. M. A. Bulletin.*